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OBSERVATIONS AND RESULTS IN THE TREATMENT OF HYPERTHYROIDISM WITH RADIOACTIVE IODINE(I^{131})*

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IT HAS now been almost ten years since the first thyrotoxic patients treated with radioactive iodine were reported by Hertz and Roberts[9] and Hamilton and Lawrence.[8] More and more evidence is accumulating that indicates this to be a highly effective mode of treatment.[3,5,6,7,12,13,15,17,18,19,20] This agent has been in use at the Mallinckrodt Institute of Radiology and Barnes Hospital since May, 1947, in the treatment of 269 patients. Although a much longer follow-up of these patients will be necessary before a final evaluation of the use of this agent in hyperthyroidism can be made, a statistical study was done in order to permit a preliminary appraisal of the therapeutic value of this agent. An earlier report of some of these patients has been published elsewhere.[8]

METHODS

The radioactive material used in all cases has been the radioactive isotope of iodine with an atomic weight of 131, a half-life of eight days and is obtained from the atomic pile at Oak Ridge, Tennessee. During the disintegration of this element both beta and gamma rays are emitted and its decay product is the element xenon. Its effectiveness lies in the fact that it is concentrated in the thyroid and the short range beta radiations do their destructive work almost entirely within the thyroid without damaging the normal adjacent structures. The gamma radiations account for only 10 to 15 per cent of the energy absorbed by the thyroid.[11]

An iodine shipment arrives weekly from Oak Ridge and its radioactivity is measured by the physicists in the department who compare it to a radium standard using a Lauritzen electroscope and apply suitable correction factors. The strength of our millicurie approximates closely the Oak Ridge millicurie since the recent change in the calibration of the latter. Calibration and measurement of the individual doses is carried out in a small "hot" laboratory which

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is used only for the storage and handling of radioactive isotopes. Since the iodine as obtained from Oak Ridge is carrier-free, a small amount of carrier in the form of sodium iodide is added to prevent loss which might occur by adherence to the glassware. It has been shown that up to 0.1 milligram of stable iodine may be given in one dose without affecting uptake of radioactive iodine by the thyroid.[1] The dose is administered after diluting it with 50 cubic centimeters of water and is dispensed in a disposable waxed paper cup.

The measurement of the excretion of radioiodine during the first twenty-four or forty-eight hours after treatment is of aid in predicting the response to a given dose and has been performed in many of our patients. Tracer doses as an aid in diagnosis have been used in selected cases.

SELECTION OF PATIENTS

Radioactive iodine therapy was advised regularly in patients with hyperthyroidism associated with diffuse goiter over the age of thirty, and in patients with postoperative recurrences of hyperthyroidism at any age. Certain patients with hyperthyroidism and multinodular goiter were treated with I^{131}. We have felt justified in treating these selected patients because of the data collected by Crile,[4] Cole, Slaughter and Majarakis,[2] and others showing that carcinoma was a very rare finding in nodular goiters associated with hyperthyroidism. Patients younger than thirty years were not treated without special indications, since their life expectancy would include the long latent period postulated as necessary for the development of a radiation induced neoplasm. This group included patients with recurrent hyperthyroidism, patients with sensitivity to or failure to respond to antithyroid drugs, or other serious complicating conditions. All patients were examined by a screening board including three physicians from the Department of Internal Medicine who determined the patient's fitness for radioiodine therapy.

DOSAGE

Dosage in the patients with diffuse goiters was based on the estimation of thyroid weight by palpation and was calculated to produce a satisfactory remission with a single dose. Most of the patients were given 0.2 millicurie per estimated gram of thyroid tissue, but more recently this was reduced to 0.15 millicurie per estimated gram of thyroid tissue. Patients with nodular goiter and with recurrent hyperthyroidism after previous surgical or roentgen therapy were usually treated with slightly larger doses since accumulated experience seemed to indicate that these patients were more resistant to I^{131}.

Radioactive iodine was usually withheld for one month if the patient had had iodine therapy, oral cholecystography, intravenous pyelography, or any other iodine medication. Inhibition of radioactive iodine uptake by the thyroid may persist for as long as three months following the cessation of stable iodine therapy[19] and Kydd *et al.*[10] have found elevation of the serum precipitable iodine as long as four months after the use of pantopaque for myelography. The mechanism for this inhibition has been studied by Wolff and Chaikoff[21] and seems to depend both on the saturation of the gland with stable iodine and on an inhibition of the conversion to organic iodine when the blood level of the iorganic iodine is high. Patients who had been receiving thiouracil derivatives were taken off the drug for at least two days prior to radioactive iodine therapy. Following treatment, patients were usually seen after intervals of three, six and ten weeks. A second dose of I^{131} was considered if the patient had not reached a state of euthyroidism, or was rapidly approaching that state at the tenth week visit.

RESULTS OF TREATMENT

Although a total of 269 patients have been treated with radioactive iodine, only 211 were treated long enough ago to permit a six month follow-up. Sixteen of the remain-

Table I

I^{131} THERAPY OF HYPERTHYROIDISM
May, 1947, to September, 1950

Total patients treated	269
Patients treated over 6 months ago	211
Patients dropped because of complicating factors—evaluation unreliable	16
Patients included for statistical studies	195

ing group of 211 patients were omitted from the series because of the presence of complicating factors rendering evaluation unreliable. These factors included: death from other causes, congestive heart failure after apparent control of the thyrotoxicosis, and surgical interference before an adequate interval of time to determine the effect of radioactive iodine therapy. Therefore, 195 patients were available for a six month observation period as recorded in Table I.

One hundred and seventeen patients with diffuse toxic goiter were treated and 64 had satisfactory remissions produced by one dose of I^{131}. Twenty-six were not controlled and were given a second dose. Twenty-five developed some degree of hypothyroidism requiring supplemental thyroid therapy, and 27 had failed to return for follow-up observation at the time of this report.

Fourteen of the 26 patients who received a second dose of I^{131} responded satisfactorily, and 6 remain under observation. Four patients now require supplemental thyroid therapy. Six patients were given a third dose. No remissions were produced by the third dose in this group, but 1 of these responded well after a fourth dose and 1 after a fifth dose. The latter patient is now in complete remission after a total of 55 millicuries. These results are shown in Table II.

Table II

DIFFUSE GOITER
117 Patients Treated with I^{131}

	First Dose	Second Dose	Third Dose	Fourth or Fifth Dose	Total
Total treated	117	26	6	4	117
Controlled	64	14	0	2	80
Hypothyroid	(25)	(4)	(0)	(0)	(29)
Not controlled	26	6	4	0	—
Incomplete follow-up	27	6	2	2	37

Thirty-five patients with hyperthyroidism associated with nodular goiter were treated. Eighteen responded well to a single dose of radioactive iodine. Eight of these now require supplemental thyroid therapy. Thirteen cases were given a second dose with resultant control of the disease in 7 of them. Four received a third dose and 1 received a fourth dose (Table III).

Table III

MULTINODULAR GOITER
35 Patients Treated with I^{131}

	First Dose	Second Dose	Third Dose	Fourth Dose	All Doses
Total treated	35	13	4	1	35
Controlled	18	7	3	0	28
Hypothyroid	(8)	(0)	(0)	0	(8)
Not controlled	13	4	1	0	—
Incomplete follow-up	4	2	0	1	7

In the group of treated patients with recurrent thyrotoxicosis following subtotal thyroidectomy there were 36 patients of whom 19 were controlled with a single dose. Only 1 of these now requires supplemental thyroid therapy. Seven were given a second dose which resulted in control of the disease in only 2 instances (Table IV).

Table IV

POSTOPERATIVE RECURRENT GOITER
36 Patients Treated with I^{131}

	First Dose	Second Dose	Total
Total	36	7	36
Controlled	19	2	21
Hypothyroid	(1)	(0)	(1)
Not controlled	8*	0	1
Incomplete follow-up	9	5	14

* One patient not given second dose.

Seven patients with thyrotoxicosis uncontrolled by roentgen therapy were treated with radioactive iodine which controlled

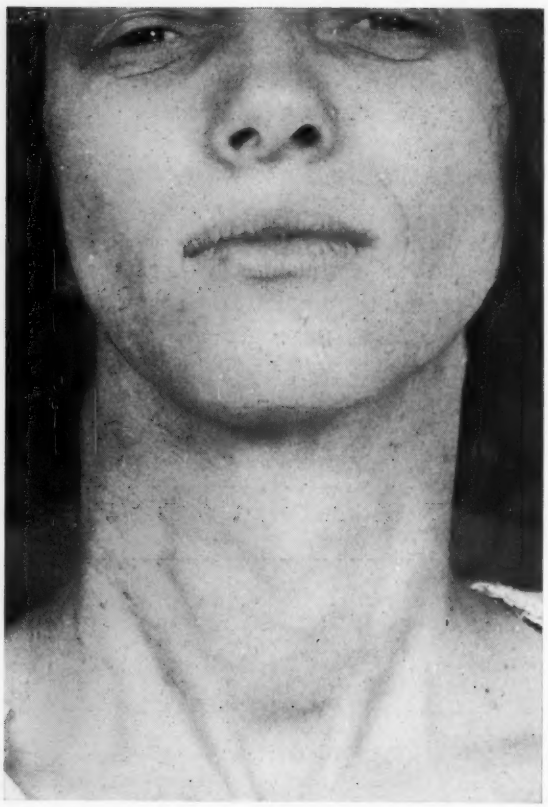


Fig. 1. Case 1. Before treatment showing diffuse thyroid enlargement.

Table V

STATISTICAL SUMMARY

	Diffuse Goiter	Nodular Goiter	Surgical Recurrent	Roentgen Therapy Recurrent	Total
Total treated	117	35	36	7	195
Controlled	80	28	21	2	131
Hypothyroid	(29)	(8)	(1)	(1)	(38)
Uncontrolled	—	—	1*	—	—
Incomplete follow-up	37	7	14	5	63

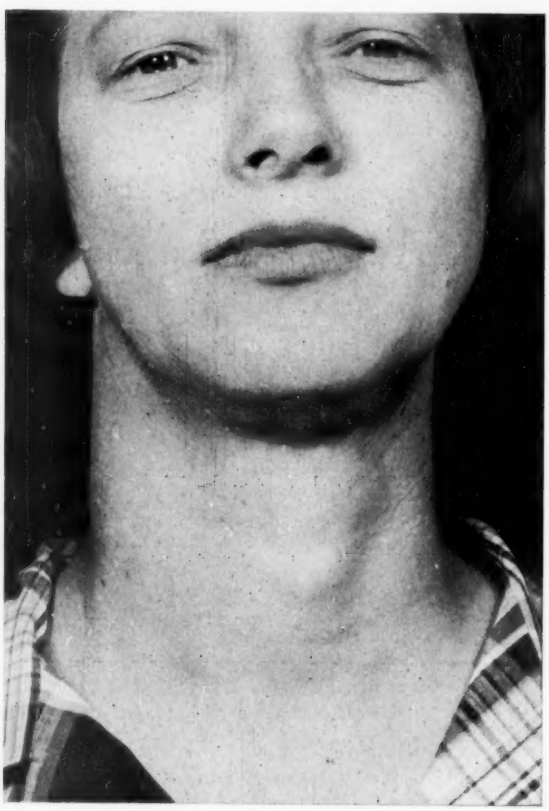
* Under observation but not given second dose.

the disease in only 1 instance. Four cases received a second dose and 1, a third dose with control of the disease in only 1 additional patient.

The 2 following brief case histories illustrate the course of a favorable response to radioactive iodine therapy.

Case 1. S. E. This patient is a female, aged thirty-six, who was referred for radioactive iodine therapy because of increasing nervousness, weight loss and thyroid enlargement occurring over a period of several years. She had taken Lugol's solution intermittently for years, although her basal metabolic rate was allegedly normal. Six months prior to hospital admission she began to experience increasing nervousness, and weight loss associated with diarrhea, excessive perspiration and palpitation. She again was placed on Lugol's solution with no favorable effect on her symptoms.

At the time of hospital entry her blood pressure was 140/90 and the pulse rate was 120. Her skin was warm and moist and she had a distinct palmar flush. No abnormal eye signs were present. In the neck a diffusely enlarged thyroid was estimated to weigh about 50 grams. Her basal metabolic rate was plus 46 per cent. She was given 10 millicuries of radioactive iodine by mouth. At the end of two months her basal metabolism was plus 12 per cent with a resting pulse of 100. After four months the thyroid enlargement had completely regressed and her metabolism was plus 7 per cent with a pulse of 88. One year after



[Fig. 2. Case 1. Six months after 10 mc. of I^{131}.

therapy her metabolic rate was minus 19 per cent, and two years later it was minus 25 per cent with a basal pulse of 76. She is feeling well and supplemental thyroid therapy has not been necessary.

Case II. A. C. This patient is a female, aged fifty-one, with a three year history of increasing nervousness, weight loss, exophthalmos and fullness in the neck. Two years prior to hospital entry a partial thyroidectomy was performed at another hospital, following which she gained 23 pounds. Seventeen months after the operation nervousness, weight loss, tachycardia and intolerance of heat re-appeared.

At the time of hospital admission her blood pressure was 190/84 with a pulse rate of 120. There was moderate exophthalmos with lid lag. Palpation of the neck disclosed a 2 cm. nodule in the region of the left lobe of the thyroid. The basal metabolic rate was plus 31 per cent. She was treated with 8 millicuries of radioactive iodine. Marked symptomatic improvement occurred during the first six weeks and at the end of two months the basal metabolic rate was zero per cent. At the end of three and one-half months, the thyroid nodule was no longer palpable and her basal metabolism was minus 4 per cent. Nineteen months later her metabolic rate had fallen to minus 15 per cent although no signs or symptoms of hypothyroidism were present.

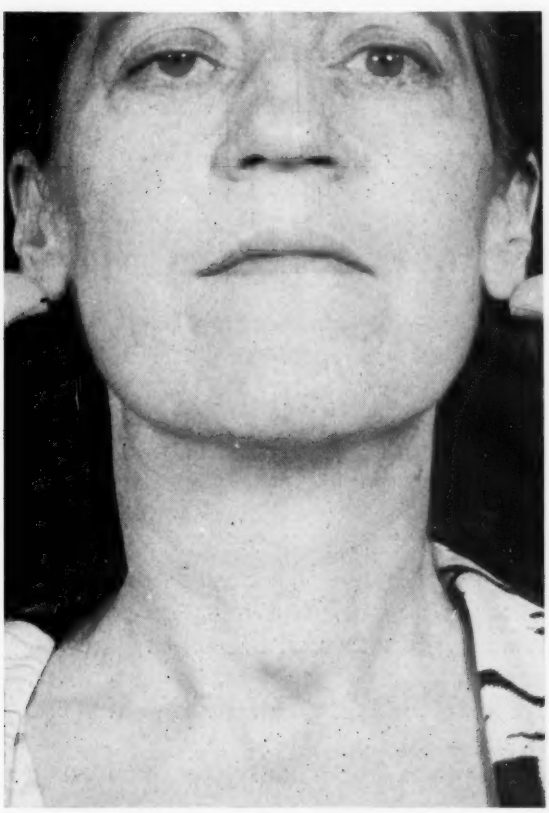


Fig. 3. Case II. Before treatment.

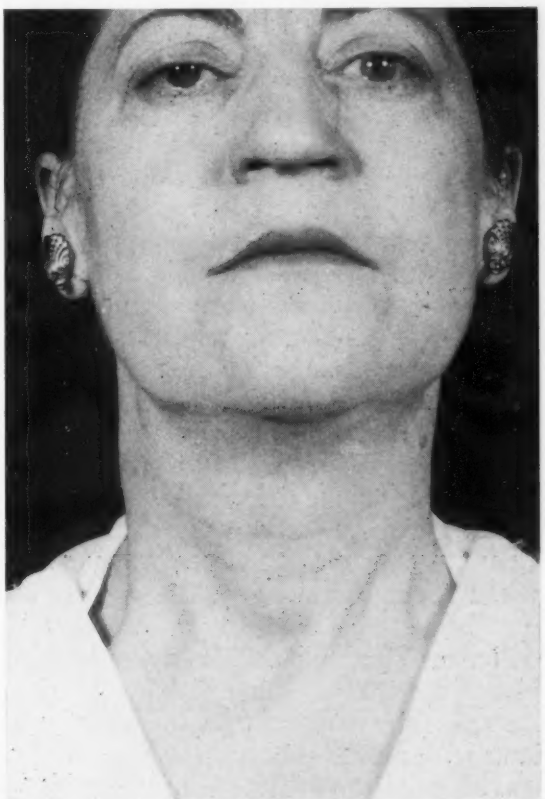


Fig. 4. Case II. Nine months after 8 mc. of I^{131}.

COMPLICATIONS

Hypothyroidism was the most common complication following radioactive iodine therapy, occurring in about 20 per cent of all patients treated. Desiccated thyroid was given as soon as clinical signs and symptoms of hypothyroidism were recognized. Supplemental thyroid was withdrawn at a later date in a number of cases for one to two months, but reinstitution of thyroid therapy was necessary in all cases because clinical evidences of hypothyroidism soon returned. This period of time may be insufficient to allow the residual thyroid tissue to return to its maximum potential function. If thyroid were withheld for a longer period of time, we believe

that a considerable number of our patients might regain a euthyroidism. This has not been done because replacement therapy is highly successful. It is interesting that 25.5 per cent of 117 patients with diffuse goiter developed hypothyroidism. Only 1 of 36 patients with recurrent thyrotoxicosis following surgery developed hypothyroidism.

Five of the patients had a temporary increase in the signs and symptoms of thyrotoxicosis during the first week following iodine administration, but in only 1 case was this of clinical importance. This observation is in accord with the findings of Soley and Miller[16] who found that the serum protein bound iodine was elevated at this time. Nausea and anorexia occurred in very few cases and was of very mild degree. Exophthalmos seemed to regress as the disease was brought under control. Malignant exophthalmos did not appear in this group after treatment. Thyroid size was reduced to normal in most of the patients with diffuse enlargement. Only slight to moderate decrease in size of toxic nodular goiters occurred. There was no evidence of damage to the recurrent laryngeal nerve or parathyroid glands.

OPTIMUM DOSAGE

Calculation of the administered oral dose according to the estimated weight of the thyroid gland is admittedly crude. A much better method is the determination of dosage in equivalent roentgens delivered to the gland as proposed by Marinelli, Quimby and Hine,[11] but this necessitates determining the amount of radioactive iodine taken up by the thyroid, the rate of its release from the gland as well as an estimation of thyroid weight. Few investigators have agreed on the amount of radioactive iodine which, when administered as a single dose, will induce satisfactory remission of the hyperthyroidism, without producing hypothyroidism. If we study the response to various amounts of I^{131} per estimated gram of thyroid in patients with diffuse goiter, we find the best therapeutic response in the dose range of 0.09 to 0.2 millicurie per gram. In this range there is a fairly constant incidence of hypothyroidism which increases significantly with doses exceeding 0.2 millicurie per gram. Most of our patients now receive 0.15 millicurie per gram.

In the patients with nodular goiter, single doses of less than 0.24 millicurie per gram produced more failures than successes while larger amounts resulted in a marked increase in the incidence of hypothyroidism. Patients with diffuse thyroid hypertrophy required on an average less radioactive iodine to effect a remission than those with nodular glands. Crile *et al.*[3] reported that slightly more than twice the number of millicuries was needed to treat nodular goiters as compared with that for Graves' disease. The time interval required to obtain a return to normal metabolism should be considered in dosage calculations. With a single adequate dose, this amounts to a four to eight week period. When repeated, small doses are used, an interval of six months may be needed to control the disease. This prolongation of the disability greatly reduces the attractiveness of radioactive iodine therapy in these cases.

SUMMARY

Two hundred and sixty-nine patients with hyperthyroidism have been treated with radioactive iodine (I^{131}) from May, 1947, to September, 1950. One hundred and ninety-five of these have been followed for six months to three years. A satisfactory remission was obtained in 68 per cent. Twenty per cent of these now require some supplemental thyroid therapy. In the remaining 32 per cent evaluation has been impossible because of inadequate follow-up. We feel that the results have established a place for radioactive iodine in the treatment of selected cases of hyperthyroidism. The optimal dosage range for I^{131} appears to lie between 0.09 to 0.2 millicurie per estimated gram of thyroid tissue. It is better to favor the smaller dosage and repeat once if necessary than to produce low hypothyroid states. With greater

clinical experience and improvement in physical methods a more accurate determination of the optimum dose should be possible.

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DISCUSSION

Dr. U. V. Portmann, Cleveland, Ohio. The authors have presented an interesting review of their experiences with I^{131}. I did not have an opportunity to see their paper until today, therefore I will tell you about our experiences, which are quite similar to theirs.

I think their article is particularly appropriate at this time because I am convinced that radiologists should supervise the use of all radioactive materials. This must be done, of course, in the cooperation with other clinicians. Radiologists certainly should be responsible for and competent to measure dosages and should recognize clinical indications for the use of radioactive materials, and actually administer them.

If radiologists do not do this, someone else

will; and radiologists will be faced with exactly the same situation with which we have been confronted for years in the use of radium by non-radiologists. We should correct the situation as far as radium is concerned, and also be prepared to take over the use of artificial radioactive materials.

In general, our results have been similar to those presented by the authors of this paper. I spoke on this subject at the recent International Congress in London. Dr. Reynolds has accepted the article for publication in the American Journal of Roentgenology and Radium Therapy. The two papers give a pretty good indication of what may be anticipated.

Of the patients with diffuse toxic goiter, that is Graves' disease, 65 per cent were in remission with one dose. The dose ranged from 7 to 10 millicuries depending upon the estimated weight of the thyroid gland. We correlate to size of the gland, the basal metabolic rate and severity of symptoms in determining dosages.

An additional 25 per cent were in remission with two doses. Three patients have an exacerbation of the disease such as described by the authors.

We contended, in one of the first papers published from our clinic by Dr. George Crile, Jr., that nodular toxic goiters require considerably more I^{131} to produce remission. We still believe this in spite of the fact that others disagree. The authors also have shown that this has been their experience—the larger the goiter, whether it is nodular or not, the more I^{131} is necessary.

Our experience with the treatment of malignant tumors of the thyroid has been rather disappointing. After all, the only patients in whom we can expect delay of the malignant process must be those with metastases which will take up the iodine. In our experience this is less than 5 per cent.

We have also used radioactive iodine for the differential diagnosis of hyperthyroidism. Although we tried it for what we call subacute thyroiditis, and Hashimoto's disease (chronic thyroiditis), there was no benefit for these diseases.

In general, I am convinced that I^{131} has caused sufficient satisfactory remissions of hyperthyroidism in approximately 75 per cent of the cases, and has eliminated the necessity for surgical procedure for many patients.

Dr. Scott (closing). Just a few points that I wish to emphasize in our paper: These patients have to be carefully selected and evaluated, preferably by a group of internists. We have worked together as a team in doing this and feel that there is a distinct advantage to the patient and to us in a careful appraisal.

Second, we are not yet ready to recommend this as a type of treatment for children in preference to certain measures that are now used.

Third, one should have the proper physical layout and a group of physicists to assist in carrying out this type of work. I do not believe it should be done without proper background and proper preparation.

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EXPERIENCES IN THE TREATMENT OF DISEASES OF THE THYROID GLAND WITH RADIOACTIVE IODINE*

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WE HAVE used I^{131} at the Cleveland Clinic for three years. It has been administered (1) in small doses (0.3 millicurie) as one test in differential diagnosis to patients with signs and symptoms simulating hyperthyroidism; a normal uptake measured with a Victoreen beta-gamma survey meter over the thyroid was considered to exclude the disease; (2) as a trial for treatment of subacute thyroiditis (pseudotuberculous, giant cell thyroiditis[1]) and Hashimoto's struma. This experiment was made because these diseases respond favorably to roentgen therapy and it was therefore postulated that they might also be influenced similarly by I^{131}; however, no benefits were observed; (3) to 6 patients with metastases from carcinoma of the thyroid following operation; only 1 with pulmonary metastases was definitely benefited by divided doses which in six months totaled 190 mc. and the disease arrested for two years; (4) the principal use of I^{131} has been in treatment of 281 patients with hyperthyroidism of whom 203 had diffuse toxic goiter (Graves' disease) and 78 nodular toxic goiter (toxic adenoma).

We believe that there are two types of hyperthyroidism: (1) that associated with diffuse goiter, and (2) that associated with nodular goiter. It was first suggested by observation in our Clinic[2] that these two types would respond differently to I^{131} and that nodular toxic goiter would require larger doses and more treatment than diffuse toxic goiter to induce remission. It is the consensus that solitary discrete adenomas should be removed surgically, because of the possibility of malignancy; however, operation is not considered imperative if multiple nodules are present.

There are three problems presented in the use of I^{131} for treatment of toxic goiter: (1) the proper selection of patients; (2) estimation of the weight of the thyroid gland; and (3) the choice of the minimal effective dosage to control the disease without ill effects. The choice of minimal or correct dosage applies especially to treatment of diffuse toxic goiter because hypothyroidism may be induced; however, it is less important in cases of nodular toxic goiter in which the chief concern is rapid control of hyperthyroidism and in which there is small risk of causing hypothyroidism with even large doses.

The diagnosis of hyperthyroidism was based principally upon clincial experience and judgment, basal metabolic rate, in questionable cases blood cholesterol determinations and tracer doses of I^{131}. After estimation of the weight of the thyroid in grams, a tracer dose (0.05 to 0.3 mc.) of I^{131} was administered and the uptake determined over the thyroid with a Geiger-Müller counter apparatus, and in some cases assays of the iodine-bound protein in the blood and excretion of iodine in the urine. Following one or more of these procedures the initial dose administered was estimated to approximate the smallest which would produce physiological response according to the size and type of goiter. In general, we used 7 mc. as the initial dose for diffuse toxic goiter in patients with small (or approximately twice normal size) thyroid glands. In some patients with unusually large thyroid glands or a severe

* Presented at the Sixth International Congress of Radiology, London, England, July 23–29, 1950.

hyperthyroidism, the initial dose was 14 or 17 mc. When we began the use of I^{131} these routine procedures were instituted for most patients with hyperthyroidism; however,we have become increasingly aware that nodular toxic goiter requires more and larger doses for control than for diffuse toxic goiter. Therefore we have given 20 or 25 mc. as the initial dose to the patient with the the nodular type.

Patients with hyperthyroidism selected for I^{131} administration include (1) those with persistent or recurrent disease after operation; (2) elderly persons; (3) those with cardiovascular complications or some other severe concurrent disease; (4) those with enlargement of the thyroid or some toxic reaction caused by administration of propyl or methyl thiouracil which discourage their continued use, or when these drugs failed to produce remission; (5) when there were one or more recurrences of hyperthyroidism after withdrawal of thiourates; (6) when surgical treatment was refused.

In the past, I^{131} was reserved for persons over forty years of age because of the remote possibility of malignancy developing years after treatment. However, there is apparently a trend toward leniency in adhering strictly to this age limit and patients from nine to seventy-four years of age have been treated if sufficient indication has existed. The parents of young patients are asked to share the responsibility of theoretical late complications.

In all of our cases of diffuse toxic goiter, the decision regarding the use of I^{131} has been influenced by our conviction of the high efficiency of the treatment. There have been no complications except hypothyroidism which has occurred in about the same proportion as following thyroidectomy. For nodular toxic goiter the decision is influenced by the possibility of some adenomas being potentially malignant or becoming so later, also by the fact that some degree of hyperthyroidism may continue for a longer time than following thyroidectomy. However, some patients with severe cardiovascular disease may become good surgical risks after the administration of I^{131}, and operations may be performed safely on those in whom the additional six months or so of hyperthyroidism might develop grave sequelae.

We have seen a few patients in whom the hyperthyroidism seemed to have become more severe in the second or third week following I^{131} therapy. Therefore, patients with extremely severe hyperthyroidism have been given propyl or methyl thiouracil preceding I^{131} therapy or the drugs have been administered two or three days following treatment.

All patients are examined at intervals of two months after I^{131} therapy and the status of their hyperthyroidism re-evaluated clinically by basal metabolic rates or other indicated studies, and if necessary more treatment is given.

I^{131} was administered to 203 patients with diffuse toxic goiter. All but 9 have been followed three or more months. Table 1 shows the relationship of basal metabolic rate to the extreme and average dosage of I^{131} for patients with diffuse toxic goiter, the percentage of remissions obtained by one dose, and the average time in months until definite remissions were obtained. This shows wide variation in the extremes of dosage administered (4 to 41 mc.). The initial amount in most cases was 7 mc. Smaller doses might have been equally effective in some cases. The average dose necessary was higher for patients with basal metabolic rates greater than 50 and the per centage of remission slightly lower from one dose. The average time for remission

Table I

Relationship of Basal Metabolic Rate to Dosage and to Remission Time for Diffuse Toxic Goiter

Basal Metabolic Rate	Extremes of Dose in Millicuries	Average Total Dose in Millicuries	Per Cent of Remission on 1 Dose	Average Time for Remission in Months
<30%	4–34	11.5	65	4.4
31–50%	4–38	11.1	69	3.9
>50%	7–41	16.0	50	4.5

was approximately the same. An average of 60 per cent were controlled by one dose within four months, irrespective of the basal metabolic rate or total dosage.

It is interesting to compare the results shown in Table I according to basal metabolic rate with those shown in Table II which is based on the estimated weight of the gland of diffuse toxic goiters. This shows rather close relationship and considerable variation in the extreme total and average dosage necessary according to the estimated weight of the thyroid (i.e., the larger the goiter, the greater the dose necessary to obtain remission). Also, there was a direct relationship of the size of the goiter to the percentage of remissions obtained from one dose (i.e., the smaller the goiter, the greater

TABLE II

RELATIONSHIP OF WEIGHT OF THYROID TO DOSAGE AND REMISSION TIME FOR DIFFUSE TOXIC GOITER

Estimated Weight of Thyroid in Grams	Extremes of Total Dose in Millicuries	Average Total Dose in Millicuries	Per Cent of Remission on 1 Dose	Average Time to Obtain Remission in Months
<40	4–21	9.7	77	3.6
40–70	7–38	12.3	54	3.9
>70	7–38	16.3	45	5.1

number of remissions obtained with one dose). The average time for remission was shorter (3.7 months) for glands estimated as less than 70 gm. and somewhat longer (5.1 months) for those of larger size.

The relationship of the basal metabolic rate and dosage for small and large goiters calculated to produce remission is shown in Table III. This indicates that the size of the goiter is of more importance than the height of the basal metabolic rate in relation to the dosage necessary to obtain remission. For example, in patients with glands extimated as weighing 50 gm. or less and basal metabolic rates of plus 50 per cent or less, the necessary dosage approximated 14.3 mc. This was also the case in the other two groups; however, there is a correlation between the severity of the hyperthyroidism as based on the basal metabolic rates and the dosage requirement.

TABLE III

AVERAGE DOSES OF I^{131} PRODUCING REMISSION IN SMALL AND LARGE DIFFUSE TOXIC GOITERS AT DIFFERENT BASAL METABOLIC RATE LEVELS

50 gm. or Less		50 to 90 gm.	
Basal Metabolic Rate	Average Dose in Millicuries	Basal Metabolic Rate	Dose in Millicuries
<30%	8.7	<30%	13.9
30–50%	8.5	30–50%	14.8
>50%	10.0	>50%	16.6

We have reason to believe that 7 patients with diffuse toxic goiter had recurrent hyperthyroidism, but in 2 our information is too meager to be conclusive. Nevertheless, in 5 we have sufficient evidence to indicate that recrudescence of hyperthyroidism developed after primary control had been accomplished. This is illustrated by a graph (Fig. 1) which clearly shows the fall of the initial basal metabolic rates to normal following I^{131} therapy, and definite rise some weeks later in each case.

The only complication we have observed in treatment of diffuse toxic goiter has been hypothyroidism which required administration of desiccated thyroid for mild hypothyroidism or definite myxedema. We have not seen exophthalmos increase severely. In 12 patients measured with Hertle's exophthalmometer change has varied from 3 mm. decrease to 4 mm. increase.

We administered I^{131} to 78 patients with nodular toxic goiter. The range of dosage of dosage of I^{131} for these cases varied greatly as compared with that necessary for the control of hyperthyroidism in diffuse toxic goiter.

Table IV shows no close relationship between the height of the basal metabolic rate and the extremes or total dosage required to produce remission. It will be noted that the lowest dose was 7 mc. which was sufficient for only 3 patients. However, it is not always possible to differentiate clini-

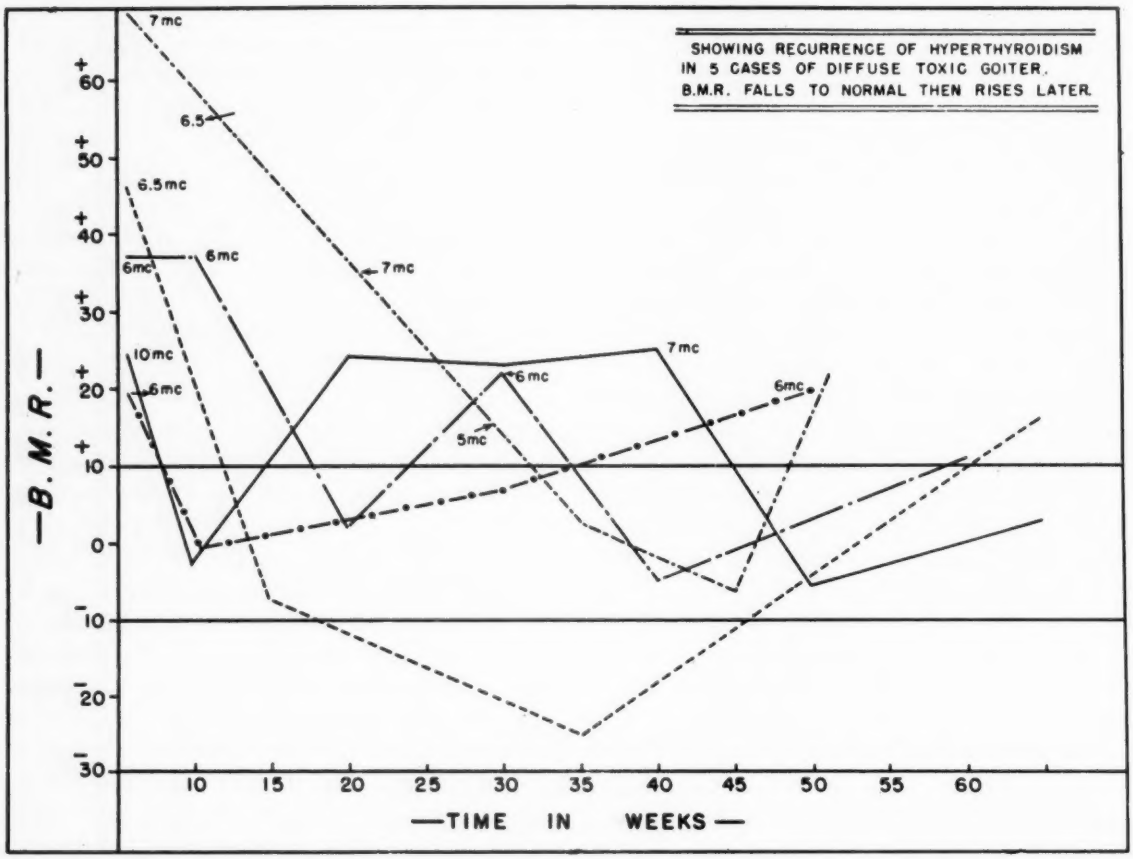

Fig. 1

cally between diffuse and nodular toxic goiter; therefore, although these 3 patients were presumed to have nodular goiter, it is possible that they may have had diffuse goiters, accounting for their responses to a small dosage. Also, it is shown that only 8.6 per cent of the patients with nodular toxic goiter and basal metabolic rate of plus 40 per cent or less underwent remission with one dose, whereas for those having rates above plus 40 per cent, more than one dose was necessary for all except 14 per cent. In contrast, it was shown in Table 1 that remissions were obtained by one dose in at least 60 per cent of the patients with diffuse toxic goiter and basal metabolic rates of approximately plus 40 per cent.

Table IV

Relationship of Basal Metabolic Rate to Dosage and Remission Time for Nodular Toxic Goiter

Basal Metabolic Rate	Extremes of Total Dose	Average Total Dose in Millicuries	Per Cent in Remission on 1 Dose	Average Time to Obtain Remission in Months
<40%	7–95	33.58	8.6	6.4
>40%	7–90	34.62	14.0	7.0

The greatest difference in dosage requirements for nodular toxic goiter is indicated by our experience with 69 per cent who required more than 14 mc. of I^{131}, as compared with only 23 per cent controlled by this dosage or less. Also, the remission time for nodular toxic goiter was longer, averaging approximately 6.8 months as compared with only 4 months for diffuse toxic goiter.

Table v shows the relationship between the estimated weight of nodular goiter, the dosage and remission time. The weight of the smallest goiter was estimated to be 30

Table V

RELATIONSHIP OF WEIGHT OF NODULAR TOXIC GOITER TO DOSAGE AND REMISSION TIME

Estimated Weight of Goiter in Grams	Extremes of Total Dose	Average Total Dose	Per Cent in Remission on 1 Dose	Average Time to Obtain Remission in Months
<90	7–76	34.09	14	7.6
>90	17–98	44.7	15	7.6

gm., the largest 350 gm., and the average 102 gm. There was an amazing reduction in the size of nodular goiters after remission which was not so remarkable in diffuse goiters which, of course, were smaller when treatment was instituted. The average time for remission for nodular toxic goiter was 7.6 months, regardless of the size of the goiter.

In our group of 78 patients with nodular toxic goiter 18 still have hyperthyroidism and may require further treatment. One patient who required 104 mc. of I^{131} had hyperthyroidism for nine months but was in remission in fifteen months after the initial therapy.

CONCLUSIONS

This is a report of our experience in the treatment of 281 patients having hyperthyroidism with I^{131}. Of these, 203 had diffuse toxic goiter and 78 nodular toxic goiter.

Of our 181 patients with diffuse toxic goiter at least 60 per cent were in remission in about four months after a total dosage of I^{131} (averaging approximately 12 mc.), regardless of basal metabolic rate or estimated weight of the goiter. Sixteen were not in remission when last seen; four of these patients have continuing hyperthyroidism and two have been followed for only three months. Recurrence developed in 2.5 per cent and hypothyroidism in approximately 10 per cent.

Of our 78 patients having nodular toxic goiter, 18 (23 per cent) still have hyperthyroidism requiring additional treatment. The severity of the hyperthyroidism in these cases appears to have little relationship to the weight of the gland, basal metabolic rate, and the dosage of I^{131} required for remission. However, the dosage for remission is higher for nodular than for diffuse toxic goiter, and the time required for control is longer. No patient with nodular toxic goiter has developed hypothyroidism.

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CARCINOMA OF THE OVARY*

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IN READING the literature on the value of radiation therapy in malignant tumors of the ovary one encounters no unanimity of opinion. This study, therefore, was undertaken in an effort to help clarify this question, if possible. Roentgen rays are basically destructive in their action, but their use is always justified when there is reasonable hope of benefit. They should not be used, however, when accumulated evidence indicates that other measures, notably surgery, will give equally good results without a significant morbidity or mortality.

The present paper embodies the results of a study of all histopathologically proved malignant tumors of the ovary treated in our department from 1930 to 1944 inclusive. The policy formulated between the Department of Obstetrics and Gynecology and the Department of Radiology has been, with few exceptions, to operate on the patient as soon as a presumptive diagnosis of ovarian tumor has been made, to remove both ovaries and do a total hysterectomy if the lesion proved to be malignant and to irradiate patients postoperatively as soon as they could be moved to the department, regardless of the extent of the neoplasm or its grading. It had only to be malignant. A total of 196 cases were diagnosed and treated as malignant tumor of the ovary in the aforementioned period(Table 1). This study also includes a follow-up of a previously reported 100 cases.[5] Six of these were later proved non-malignant. Of the remaining 190 cases, 58 survived five years or more, giving an absolute survival rate of 30.4 per cent. In the first 95 malignant tumors reported earlier, 38, or 40 per cent, lived five years or more.

TABLE I

SUMMARY OF RESULTS

Period	1930–1938	1939–1944	1930–1944
Total cases	108	88	196
Non-malignant	6	0	6
Malignant	102	88	190
Dead less than 5 years	64	68	132
Indeterminate	9	10	19
Determinate dead	55	58	113
Five year survivals	38	20	58
Indeterminate	4	2	6
Determinate survivals	34	18	52
Determinate cases	89	76	165
Determinate 5 year survival rate	38.2%	23.7%	31.5%
Absolute 5 year survival rate	37.1%	22.8%	30.4%

The approach to the study of the present group of patients is somewhat different than that previously used in that only cases proved by pathologic studies are admitted to the series whereas those with a clinical diagnosis of carcinoma and who died of the disease were previously also considered as

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proved. This selection leaves 165 cases upon which this study is based, and which composes the determinate group. Since all cases were traced and none was eliminated because of death by intercurrent disease, this selection removed only those not having definite pathologic proof of malignant tumor. That this selection made no significant difference is evident from the absolute survival rate of 30.4 per cent compared with a corrected value of 31.5 per cent. All tables with the exception of the final results are based on 165 proved and reviewed cases.

The classification of all cases follows that previously used and is a slight modification of that of Heyman.[4]

Group I: Those cases in which removal of all the primary tumor and all visible metastases was possible.

Group II: Those who had (a) ascites with malignant cells or spill of malignant cells into the peritoneal cavity at time of operation; or (b) partial or total removal of the primary lesion but in whom there were visible metastases remaining.

Group III: Recurrence of malignant tumor following either operation or irradiation.

Group IV: Inoperable tumor; exploratory or paracentesis only; distant metastases.

TABLE II

PROVED CASES OF CARCINOMA OF OVARY TREATED AT UNIVERSITY HOSPITALS IOWA CITY, IOWA

1930–1944

Group	No. Cases	Per Cent Total Cases	No. 5 Year Survivals	Per Cent 5 Year Survivals
1930–1938				
I	32	35.3	17	53.2
IIa (spill)	9	11.7	5	55.5
IIb (implants)	22	25.3	10	45.5
III	3	3.4	0	0.0
IV	23	24.4	2	8.7
Total	89	—	34	38.2%
1939–1944				
I	14	18.7	7	50.0
IIa (spill)	19	25.3	7	36.9
IIb (implants)	13	16.0	3	23.1
III	9	12.0	1	11.1
IV	21	28.0	0	0.0
Total	76	—	18	23.7%
1930–1944				
I	46	27.7	24	52.1
IIa (spill)	28	17.3	12	42.8
IIb (implants)	35	20.9	13	37.2
III	12	7.6	1	8.3
IV	44	26.5	2	4.3
Total	165	—	52	31.5%

TABLE III

AGE DISTRIBUTION

Years	Per Cent of Cases	Per Cent of Cases Corrected for Population Spread
20–29	4.84	3.2
30–39	20.6	16.0
40–49	27.2	22.8
50–59	33.3	34.0
60–69	9.6	13.7
70–79	5.4	10.1

The distribution of these cases is shown in Table II. Forty-six cases fell into Group I, 28 into Group IIa (spill), 35 in Group IIb (implants), 12 in Group III, and 44 in Group IV. When this is broken down into the two periods a striking reversal of the ratio of Groups I and IV is shown. Group I was heavily preponderant in the earlier series and Groups III and IV in the later period. This in considerable measure, but not completely, accounts for the difference in the five year survival figures of the two series. If the distribution spread of one series is multiplied by the survival rate of the other, theoretical figures of 33.7 per cent survival for the first and 27.6 per cent survival for the second are obtained.

Age. The age distribution is shown in Table III. This shows the peak incidence in the fifth decade. The mean age for the entire series was 48.6 years, which is slightly younger than for cases in the previously reported series. The mean age of the survivors was 45.2 years and for the non-survivors, 50.2 years.

In a number of malignant entities such as carcinoma of the cervix or breast a

TABLE IV

FIVE YEAR SURVIVAL ACCORDING TO PATHOLOGY, 1930–1944

Pathology	No. of Cases						Per Cent and No. 5 Year Survivals					
	I	IIa	IIb	III	IV	Total	I	IIa	IIb	III	IV	Total
Papillary cystadenocarcinoma	19	18	22	4	16	79	58% 11	55.5% 10	45.5% 10	25% 1	6.2% 1	41.8% 33
Solid carcinoma	13	6	8	7	28	62	38.4% 5	16.6% 1	37.7% 3	0 0	16.6% 1	15.9% 10
Pseudomucinous cystadenocarcinoma	8	3	3	—	—	14	62.5% 5	33% 1	0 0	—	—	42.8% 6
Teratoma with malignant changes	1	—	2	—	—	3	0 0	— —	0 0	— —	— —	0 0
Dysgerminoma	1	1	—	—	—	2	100% 1	0 0	—	—	—	50% 1
Granulosa cell carcinoma	2	—	—	—	—	2	50% 1	— —	—	—	—	50% 1
Fibrosarcoma	1	—	—	—	—	1	100% 1	— —	—	—	—	100% 1
Malignant ovarian cyst	1	—	—	—	—	1	0 0	— —	—	— 0	— —	0 0
Cystadenoma malignum	—	—	—	1	—	1	—	—	—	0	—	0
Total by groups	46	28	35	12	44	165	52.1% 24	42.8% 12	37.2% 13	8.3% 1	4.3% 2	31.5% 52

correction of the age distribution for age spread of population will result in a rising incidence of occurrence along with advancing age. In this series the distribution is little changed by such a procedure suggesting that the anatomical and physiological changes occurring in the ovary during the late forties and early fifties may be a predisposing factor in the development of some ovarian malignancies.

Pathology. As stated above, only those cases which could be reviewed pathologically are included in this series of 165 cases. Actually, of the 196 cases diagnosed and treated as malignant ovarian neoplasms, 186 were confirmed by histopathologic study. However, at the time of review and restudy, the slides or tissue of 21 cases were not available. Such terms as "malignant ovarian cyst" and "cystadenoma malignum" have been retained only in order to make the distribution of cases conform to that of the previous article. Almost half (48 per cent) of the cases were papillary cystadenocarcinoma, about one-third (37.5 per cent) were solid carcinomas, a few (8.5 per cent) pseudomucinous cystadenocarcinoma, while a miscellaneous group of 6 per cent was made up of teratomas, dysgerminoma, granulosa cell carcinoma, etc. This distribution does not differ greatly from that reported by other authors.[1,8] Table IV lists the number of cases according to group and pathology and also gives the number and per cent of survivors in each category. It is obvious when broken down in this manner that the number of cases in each division is too small to be statistically significant. Survival rates for papillary and pseudomucinous cystadenocarcinomas are approximately the same (42 per cent and 46 per cent respectively), while solid carcinoma carries a very poor prognosis. Only 16 per cent were alive after five years.

Treatment. Since this series of cases were all treated by radiation, we have no figures on the use of surgery alone. Other authors,[2,6,10] however, give results of surgical therapy without irradiation. As postoperative irradiation is given to all patients

with proved malignant ovarian tumor, there is no rationale in leaving the apparently uninvolved ovary in place. Munnell and Taylor[8] have pointed out that the absence of gross carcinoma does not rule out malignant involvement. They also show in their recent excellent study of 200 cases of ovarian carcinoma that tumors of low grade malignancies do as well or better with surgery alone as with added irradiation. In the treatment of the more malignant tumors, however, there appears to be a definite improvement in the results by the addition of irradiation.

Prior to 1936 various methods of irradiation were used in our department with only an occasional case receiving what we now consider an "adequate" tumor dose. Since then the general form of treatment has been with 200 kv., 8 or 20 ma., 50 cm. distance and Thoraeus filter (half-value layer 1.95 mm. Cu). Two anterior, posterior and lateral 10 by 15 cm. fields have ordinarily been used and doses of 200 r to each of two fields were given in rotation for six days a week. Each field was given from 1,800 to 2,400 r, air dose, depending on the patient's size and condition. An attempt was made to deliver a mid pelvic dose of at least 4,000 r in a period not to exceed five weeks.

In a few instances where there was extensive involvement and the patient's condition justified it, a second course of treatment was given to the upper abdomen through anterior, posterior and lateral 10 by 15 cm. fields. The combination of extensive involvement and good general condition is not frequently encountered, however, so that not many cases received the second or supplementary course of therapy. Also, as is well known, intensive irradiation to the upper abdomen and epigastrium frequently results in distressing nausea and vomiting which necessitates discontinuation of the treatment.

Follow-up of the First Series. At the time of the first report, 34 patients had survived more than five years. These have all been followed till their death or to within six months of this report. Twenty-one, or 62 per cent, are alive and well from ten to eighteen years following institution of treatment. Of these 21 patients, 13 were in Group I, 3 in Group IIa and 5 in Group IIb. Ten of them had papillary cystadenocarcinoma and 1 each had granulosa cell tumor, fibrosarcoma and dysgerminoma.

Seven, or 20.6 per cent, of the survivors of this first period died of their ovarian disease. All had papillary cystadenocarcinoma. One was Group IIa, 1 was Group IV and 5 were Group IIb. Four died in the fifth year, 1 each in the sixth, ninth and sixteenth years following treatment. The last mentioned patient was last seen in her fifth year, at which time it was thought that she had obvious carcinoma. She remained an invalid but lived ten more years. Three other patients (8.8 per cent) died of carcinoma other than that of the ovary. One had a carcinoma of the tongue six years later, 1 a carcinoma of the breast nine years after treatment and 1 a carcinoma of the vaginal vault nine years following therapy. In this last case, the microscopic pathology of the two lesions was so different that the second was considered a new neoplasm.

Of the remaining 3 cases, 1 died of unknown cause at 106 months, having been clinically free of carcinoma for over seven years, 1 of cardiovascular disease at 67 months and 1 of diabetes and arteriosclerosis at 177 months.

Results of the Entire Series. Table 1 gives the five year survival rate by periods and as a whole. The rate of 31.5 per cent is not so good as that reported in 1945 but compares closely with the results of Munnell and Taylor[8] (30.8 per cent), May[6] (31 per cent) and Heyman[4] (31.3 per cent). Series can be found with results ranging from 6.3 per cent reported by Walter, Bachman and Harris[10] to 65.4 per cent reported by Counseller.[2] Since all these series are small they are easily influenced statistically by the type and extent of the pathology. The Group I survival rate of 52.1 per cent, Group IIa 42.8 per cent, Group IIb 37.2 per cent,

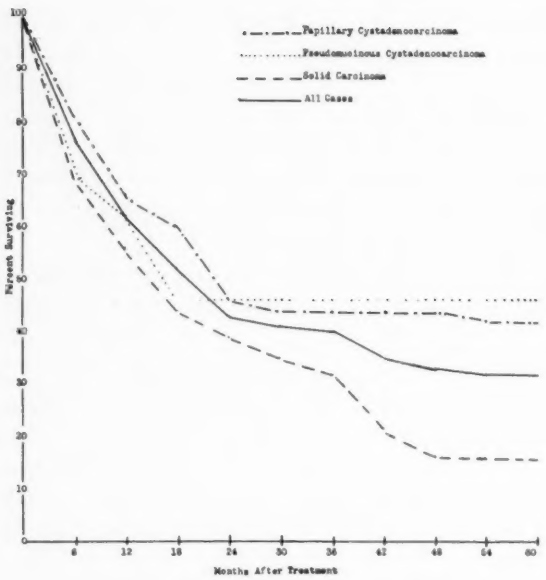

FIG. 1. Survival after treatment.

Group III 8.3 per cent and Group IV 4.3 per cent shows the declining chance of survival with increased extent of the disease and previous unsuccessful therapy as is the case with practically all malignant tumors.

Pseudomucinous cystadenocarcinoma showed the best prognosis, with 46 per cent, of all and 62.5 per cent of the Group I cases being alive and well at five years. Papillary cystadenocarcinoma (42 per cent) had only a slightly poorer prognosis with 58.3 per cent of the Group I surviving. Solid carcinoma (16 per cent) is generally conceded to have the poorest prognosis (38.5 per cent of Group I living five years). As stated above, absolute five year survival was also computed on the basis of 58 survivors from 190 cases diagnosed as having malignant ovarian tumor. This gives 30.4 per cent and indicates that our selection did not bias the results.

Survival Curves. While it is customary to report results on the basis of five year survivals much additional information can be gained by the study of survival curves. Figure I shows such curves for all cases and for the three major pathologic entities. The curves for pseudomucinous and papillary cystadenocarcinoma tend to flatten out at eighteen and thirty months respectively. That of solid carcinoma shows the disease still taking its toll up to the fourth year. Extension of these curves beyond the five year period makes little difference except in the case of papillary cystadenocarcinoma. Figure 2 shows this curve extended for a period of fifteen years plotted with all cases and also with only the Group IIb cases. In the latter there is a notable secondary drop between the fifth and seventh years. After that time the curve again levels off. The significance of this will be commented on later.

COMMENT

Because of the wide variation in the histopathologic nature in different parts of the same tumor, our Department of Pathology was loath to grade these tumors. This factor therefore, has not entered materially into our thinking regarding the care of these patients. Also, the question of unilaterality and bilaterality of the disease did not enter because all patients with proved malignant tumor had bilateral oöphorectomy and were irradiated. From the above study, however, it appears that patients in Group I have

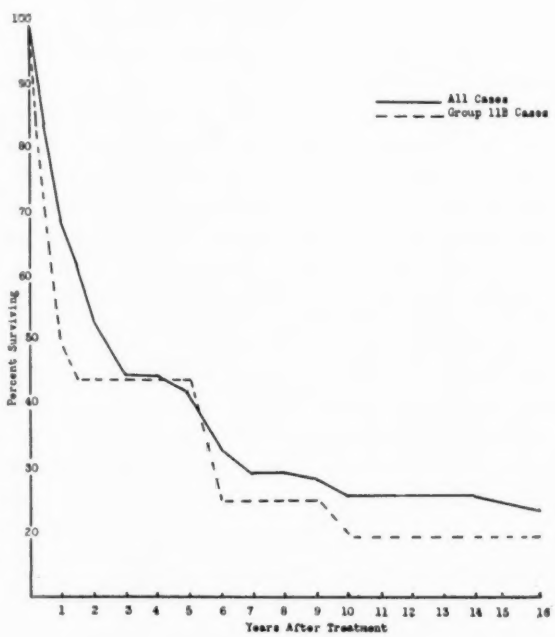

FIG. 2. Survival after treatment of papillary cystadenocarcinoma.

not done significantly better with irradiation than those in the corresponding group in series studied by other authors where surgery alone was used. We have no control series of our own, however, and cannot, therefore, draw conclusions in this regard from our own work. There seems, however to be a good indication that all cases except those in Group 1 should receive postoperative irradiation in full doses.

Study of the follow-up on the earlier series and especially a study of the survival curves shows that while five year survival may be an acceptable criterion for results in the pseudomucinous cystadenocarcinoma and solid carcinoma cases, it is not in the case of papillary cystadenocarcinoma, especially those with remaining peritoneal implants. Of the 17 patients with papillary cystadenocarcinoma alive at five years 7, or 41 per cent, later died of the disease. Of these 7 cases, 5, or 71 per cent, fell in Group IIb. Thus patients with this type of disease must be followed for at least seven years before statistics based on survival are of much value. This is particularly true of those with peritoneal implants.

SUMMARY

1. A study of 165 proved cases of malignant tumor of the ovary is presented.

2. Pseudomucinous cystadenocarcinoma offers the best prognosis with 46 per cent surviving five years. Papillary cystadenocarcinoma was next best with 42 per cent, and solid carcinoma was poorest with only 16 per cent five year survival.

3. Five year survival is not adequate in the case of papillary cystadenocarcinoma as 20 per cent die after that time of the disease.

4. Postoperative irradiation should always be given to any case that falls outside Group 1.

5. We are not sure that cases in Group 1 are actually benefited by irradiation in addition to fairly radical surgery.

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DISCUSSION

Dr. Harold W. Jacox, New York, N.Y. We have just heard an authoritative long-term report of the effects of roentgen therapy upon a sizeable group of patients with a type of genital cancer which carries an impressive morbidity and mortality. Our experience with 200 primary cases from clinic and private practice at the Sloane Hospital for Women of the Columbia-Presbyterian Medical Center seen from 1922 through 1943 and reported by Munnell and Taylor closely parallels the essayists' experience. The over-all relative five year survival rate was 30.8 per cent, and the absolute rate was 27.5 per cent. Papillary pseudomucinous cystadenocarcinoma and granular cell tumors were the two most favorable types, with relative cure rates for each being above 60 per cent. No five year survivals resulted in those patients with undifferentiated adenocarcinoma, unclassifiable carcinoma or those who were not operated upon. Almost two-thirds of the total group were patients with papillary cystadeno-

carcinoma (as compared with about half of their series); the five year survival rates for this group are close to the over-all figures, being 35.8 per cent relative and 30.4 per cent absolute.

From the standpoint of clinical extent of disease, the best five year survival rates occur when there has been no spread beyond the ovaries. Whether ovarian involvement is unilateral or bilateral does not seem important in prognosis. Of 9 survivors of five years or more who had widespread disease all but one were of low grade histopathologic malignancy. Clinical extent of disease is considerably dependent upon the histopathologic type and degree of histopathologic malignancy. The tumors of high grade malignancy are more frequently found to have spread outside the ovaries by the time the patient comes to operation. In our series, 64 per cent had gross evidence of peritoneal or visceral metastases at the time of operation.

Complete surgical removal of the internal genitalia remains the treatment of choice. Radiation therapy has a definite place in the treatment of certain cases of ovarian cancer, chiefly to prolong survival time and perhaps occasionally, although rarely, to cure residual disease. It should be administered to all patients with tumors of high grade histopathologic malignancy even if localized to one or both ovaries. It seems of no value in tumors of low grade histopathologic malignancy unless there is operative evidence of spread beyond the ovaries; in this event, roentgen therapy should be given. It should be given to all patients with extension of tumor beyond the ovaries regardless of the amount of spread and regardless of histopathologic type. It should not be withheld from the apparently hopeless case for in 2 instances in our series it converted inoperable cases to operable ones. One patient died after four years, possibly of another disease, and the other is living and well after fifteen years.

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ROENTGENOLOGICAL MANIFESTATIONS OF GASTRODUODENAL ULCERATION IN THE NEWBORN*

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THE problem of ulceration of the gastrointestinal tract in the newborn, with its severe complications and high mortality, is not a new one. It was first reported by Cruveilhier[5] in 1829–1835, in his "Anatomie Pathologique du Corps Humain." He recorded the presence of multiple gastric ulcers in 3 infants at the ages of one, two, and three weeks. Since that time many reports have been made in the literature concerning this serious condition. The lesion is infrequent, as indicated by the report of Bonnaire, Durante and Ecalle,[4] in which only 2 cases of duodenal ulcers were found in 4,000 routine autopsies of the newborn. Guthrie[11] found 9 cases in 6,059 postmortem examinations at Glasgow Royal Hospital for Sick Children. Six of these were in infants under three months of age. Eighteen cases of gastroduodenal ulceration have been found at Children's Hospital of Michigan from 1940 to 1949, in 1,922 autopsies. Despite the infrequency of the condition, we believe that it warrants further attention.

The etiology of gastroduodenal ulceration has not been definitely determined, but the following factors have been considered by Guthrie and others:

1. Circulatory disturbances of the gastrointestinal tract

(a) by prolonged labor;

(b) from injury to the vasomotor centers of the brain as a result of hemorrhage, as discussed by Cushing;[6]

(c) by mechanical pressure. Aschoff (quoted by von Pfaundler and Schlossman[17]) has described anemia of the duodenum resulting from compression of that structure between the liver and head of the pancreas during birth. Theile[24] concluded that any serious disturbance of the circulation may be the starting point of any ulcer.

2. High gastric acidity would appear to be an important factor as indicated by the work of Miller,[16] who found a very high acidity, reaching the adult level within forty-eight hours after birth.

3. Trauma incident to instrumentation for gavage may be considered a remote possibility. Trauma from ingestion of a caustic substance has been known to cause ulcers.

4. Sepsis may be a factor. Dunham and Shelton[7] describe an instance of staphylococcal omphalitis followed by septic thrombosis of the umbilical vein, with resulting septicemia and ulceration of the gastric mucosa.

5. Burns and marasmus have been observed in association with gastroduodenal ulceration in older infants and children.

A review of the literature has shown that the use of roentgenologic methods of diagnosis in this condition has been infrequent, and the diagnosis has usually been made by postmortem examination.

The first report of a survival from operation of the stomach in an infant was by Selinger[22] in 1932. Here, the perforation was treated by primary closure. Bird, Limper and Mayer[2] reviewed 245 cases, ranging in age from eleven days to fifteen years. Only 5 of these had primary closure, with Selinger's being the only survival. These authors report, in addition, their case of a thirty-four hour old baby who survived. Their patient was operated on immediately following roentgen diagnosis of a ruptured viscus, based on the presence of air and fluid in the abdomen. A duodenal ulcer was closed and the patient survived without any residual gastrointestinal deformity. The next reported case to survive, was that of Schwartz and Halberstam[20] in 1943; this was an eleven month old infant. Here again the roentgen examinations,

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made because the baby passed bloody stools and had a distended abdomen, showed free intraperitoneal gas under the diaphragm. A diagnosis of perforated viscus was made and an operation performed, with primary closure of a perforated duodenal ulcer. The patient was discharged three months later in good condition following a stormy postoperative course. Films of the gastrointestinal tract two months later showed some narrowing of the second portion of the duodenum, with slight gastric retention at the end of five hours.

Quinn[19] reported 3 fatal cases of gastroduodenal ulceration in the newborn. Their ages were six days, five days, and five days. The first had no roentgen examination or surgery and died twenty-four hours following onset of symptoms. The second had a roentgen examination of the abdomen which showed no diagnostic signs of perforation; however, at surgery a perforation of the first part of the duodenum was found. The third case had a roentgen examination at the age of two days, with the demonstration of a pneumoperitoneum, resulting in the diagnosis of a ruptured viscus. At operation a perforated ulcer of the stomach was found and closed. The patient died at the age of five days with a complicating pneumonia. Holt and Howland[12] collected a series of 95 cases of gastroduodenal ulceration. Seventy per cent of these occurred between the ages of six weeks and five months, and 10 per cent in the newborn. These cases were proved at the autopsy table. The diagnosis, when made clinically, was on the basis of bleeding from the gastrointestinal tract. No roentgen examinations were made in this series. Of these cases, 66 per cent died with perforation or hemorrhage, and 33 per cent died without symptoms of ulcer. There are many other single reports of ruptured ulcer causing death.[1,8,21,25]

A review of the autopsy records in the Department of Pathology, Children's Hospital of Michigan, from 1940 to 1949, disclosed 18 cases under two months of age with ulceration of the gastroduodenal tract. The majority of these were under one month of age. Of these 18 cases, 4 had been examined roentgenologically and these are reported in detail. The information obtained from these cases is as follows:

9 (50 per cent) exhibited brain damage on postmortem examination;
12 (66 per cent) were premature infants—birth weight under 5½ pounds;
2 (11 per cent) had clinical evidence of an active infection on admission to the hospital;
8 (44 per cent) had vomiting on admission, and 6 of these developed hematemesis;
6 (33 per cent) exhibited evidence of brain damage clinically by cyanosis, irritability or convulsions; average age at death was 12.8 days;

Ulcerations were in the stomach in 17 cases and in the duodenum in only one.

It was interesting to find the high incidence of brain damage associated with ulcer formation and for this reason it was included in the study.

DISCUSSION

It appears that the diagnosis of gastroduodenal ulceration in the newborn is not often made clinically, although this condition is not a rare pathological entity. It may be suspected in an infant who vomits early in the newborn period and gives evidence of hemorrhage from the stomach or upper intestines, either as hematemesis or melena. Prematurity and evidence of brain injury are frequently associated and form part of the typical clinical picture.

The contribution of the roentgen examination to the diagnosis is limited by several factors but it appears that some contribution can be made, at least in some cases, and that such a study is indicated when the condition is suspected.

It is quite improbable that a direct visualization of an ulcer by contrast medium could be obtained in an infant as in an adult. The ulcers are very shallow by measurement (if not relative to the thickness of the gastric or duodenal wall) and, being

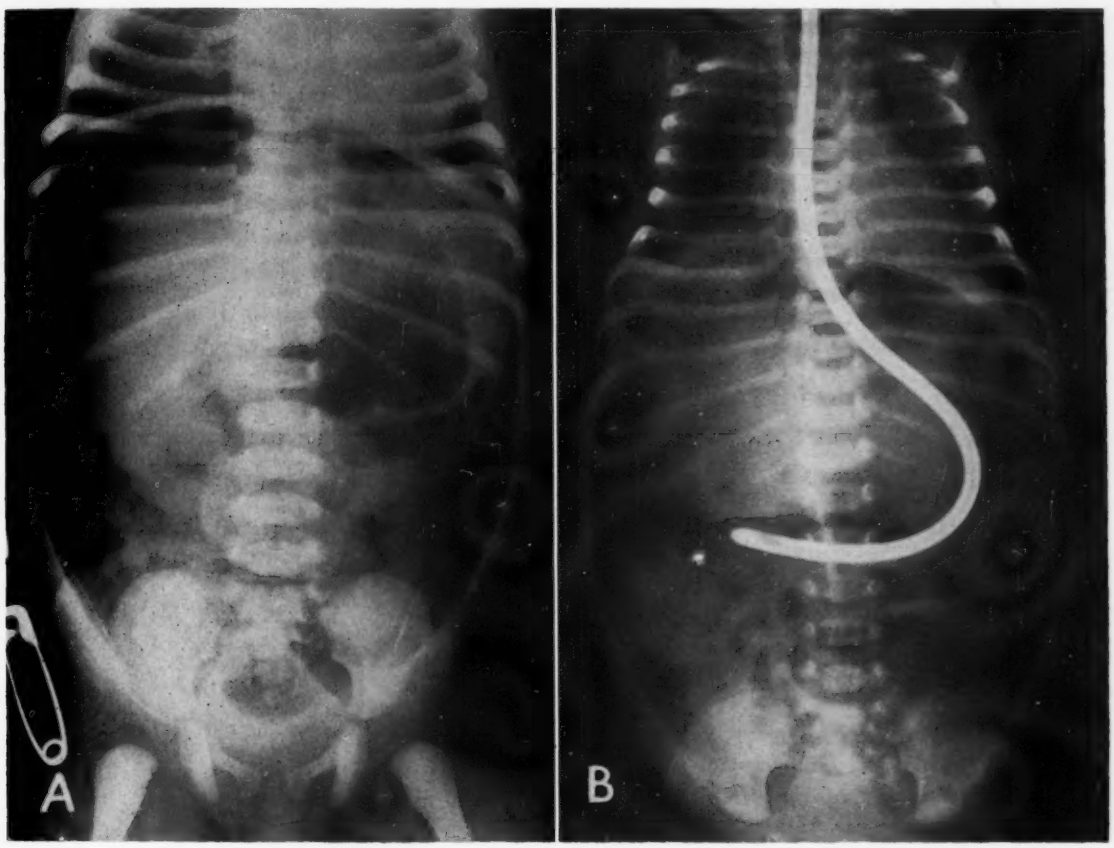

Fig. 1. (*A*) Case 1. J.L. Birth weight 5 lb., 3 oz. Large pneumoperitoneum in a four day old infant hospitalized for vomiting and hematemesis. Autopsy disclosed multiple duodenal ulcers with perforation.

(*B*) Case 11. W.R. Birth weight 5 lb., 5 oz. Large pneumoperitoneum in a six day old infant hospitalized for fever and abdominal distention with a diagnosis of sepsis and peritonitis. Laparotomy showed a large amount of gas and cloudy fluid in the peritoneal cavity. At autopsy a perforated ulcer was found on the greater curvature side of the stomach posteriorly, and there were petechial hemorrhages in the brain.

acute, are not associated with the scarring deformities of the chronic peptic ulcer in the adult.

An ulcer may give fairly certain evidence of its existence when it has perforated and gas is recognized as free in the abdominal cavity. If the amount of gas is large, it may be recognized in a roentgenogram of the abdomen made with the patient in a supine position, as in the following cases:

Case 1. This baby weighed 5 lb., 3 oz. at birth. About twelve hours following birth the baby began vomiting her feedings, which changed from vomiting of food to that of blood. She had passed one meconium stool and had urinated only once in three days.

Physical examination on admission, September 22, 1944, revealed a dehydrated baby with a distended and tense abdomen. Laboratory data revealed only a slight increase of the white blood cell count (11,400).

Immediately following admission the baby was started on fluids and chemotherapy. Gastric lavage revealed some greenish fluid mixed with blood. Five hours after admission the abdomen became markedly distended and again vomiting of blood began. Roentgenograms were taken (Fig. 1*A*), and these revealed free air in the peritoneal cavity indicating a ruptured viscus. Surgery was not thought advisable in view of the patient's condition. Two days after admission a paracentesis was done and 120 cc. of air and 30 cc. of bloody serous fluid obtained. On September 26, 1944, a chest

and abdominal roentgenogram revealed a capillary type of bronchitis and a diminished amount of free air in the abdominal cavity. The patient became progressively worse and died on September 29, 1944, seven days after admission.

An autopsy revealed two duodenal ulcers with perforation of one. Peritonitis and aspiration pneumonia were also found to be present. Examination of the brain was negative.

Case II. W.R. This baby weighed 5 lb., 5½ oz. at birth. The baby did well until four days after birth, at which time he suddenly developed a temperature of 102.8°F. and began vomiting. The abdomen then became distended and the baby became slightly cyanotic after vomiting. The baby had normal stools prior to the onset of symptoms. The abdomen became progressively distended and tympanitic, and the baby was admitted to Children's Hospital of Michigan in this condition.

Physical examination revealed the distended abdomen with prominent veins over it and an associated edema of the skin. A bluish discoloration was noted about the umbilicus. On rectal examination blood-stained mucus was obtained, and fecal material was aspirated from the stomach. Laboratory data revealed a low white blood cell count (3,900); stool positive for blood.

Immediately following admission, a roentgenogram of the abdomen revealed gas and fluid in the abdominal cavity (Fig. 1*B*), this being confirmed by surgical exploration shortly thereafter. At surgery no evidence of obstruc-

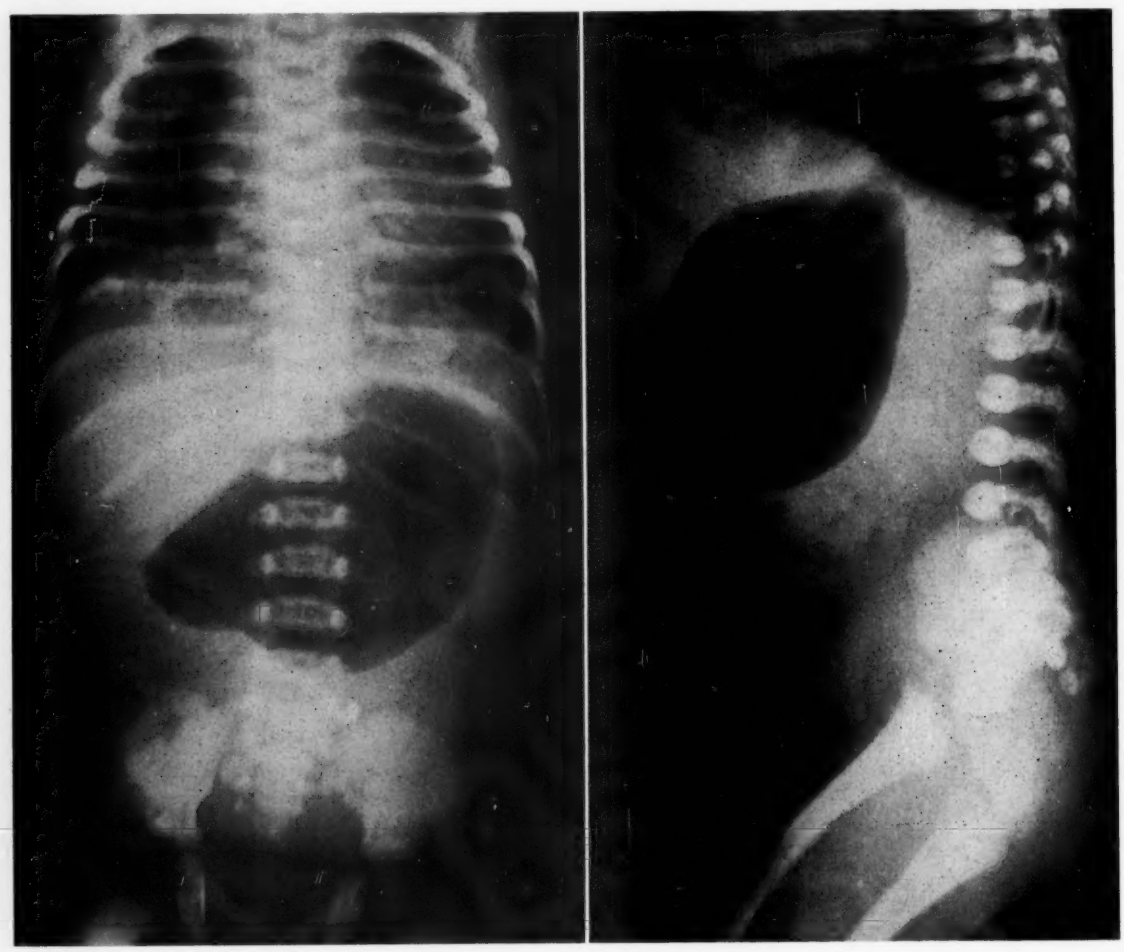

Fig. 2. Case III. O.B. Birth weight 4 lb., 10 oz. Gas-distended stomach with only small traces of gas in the bowel in a five day old infant hospitalized for hematemesis and melena. At laparotomy a perforation was found in the stomach and it was closed. At autopsy a gastric ulcer was found with evidence of perforation.

tion or perforation was noted in the entire length of the small intestine. The baby left the operating room in poor condition and postoperatively did poorly, dying the following day, May 12, 1949. Postmortem examination revealed a large perforated ulcer on the posterior greater curvature of the stomach which was covered by fine adhesions. There was also an associated peritonitis. Examination of the brain was negative.

However, for detection of small amounts of gas, an upright position is more desirable to permit recognition of the gas beneath the left leaf of the diaphragm. If the perforation is very small, the escape of gas may not occur in sufficient amount to be detectable, as in the following case:

Case III. O. B. This baby weighed 4 lb., 11 oz. at birth. The baby did well until two days after birth, at which time he began vomiting brownish material and passing black tarry stools.

Physical examination on admission at four days of age was essentially negative.

Laboratory data revealed positive test for blood in vomitus and stools.

The day after admission a roentgenogram of the abdomen (Fig. 2) revealed a distended stomach with only small amounts of gas in the intestine. Surgery was performed and revealed a perforation of the stomach on the anterior surface and several large adhesive bands between the first and third parts of the duodenum and gallbladder. These were removed and the perforation closed. He did well immediately postoperative. At ten days postoperatively he began regurgitating part of his feedings. A gastrointestinal series performed at this time revealed a high degree of obstruction at the pylorus. He was again operated upon and was found to have many well organized adhesions without evidence of another perforation. Following this operation he did poorly and began vomiting coffee ground material. His condition became gradually retrogressive and he died thirty days after admission. Postmortem revealed a perforated ulcer of the stomach and peritonitis. Examination of the brain was negative.

If a detectable amount of gas has escaped, the existence of gastroduodenal ulceration with perforation may be assumed with a high degree of probability, excluding the remote possibilities of perforation lower in the intestinal tract and subdiaphragmatic abscess with a gas-forming organism.

Gastroduodenal ulceration may also give roentgen evidence of its presence by dysfunction of the pylorus, as in Case IV.

Case IV. B.C. (one of twins). This baby weighed 3 lb., 9½ oz. at birth, born two months before the expected date. She was admitted to Children's Hospital of Michigan two hours after birth in good condition. Physical examination and laboratory findings on admission were negative. Two days after admission a large amount of blood was spit up following the removal of a feeding tube. Following this the baby took its feedings well but continued to spit up blood. Blood was noted in the stools in the evening of the same day. Wangensteen aspiration revealed 25 cc. of pink homogeneous fluid, as well as a large amount of gas from the stomach. Physical examination at this time revealed rales in the lung.

The following morning, three days after admission, a flat film of the abdomen showed a greatly dilated stomach with only a small amount of gas below (Fig. 3), thought to have been introduced by a rectal thermometer. Surgery was performed that day and no cause for obstruction found. The stomach was markedly dilated, and gastroenterostomy was considered but was discarded following deflation of the stomach and the sudden appearance of air entering the small intestine. The patient did poorly following surgery and died four days after admission. Postmortem findings revealed multiple gastric ulcers, pulmonary hemorrhage and prematurity. Brain examination was negative.

An infant presents a most unusual appearance in the roentgenogram of the abdomen when the stomach is distended by gas and no gas is detectable in the small or large intestine. In the absence of organic obstruction, as was suspected in Case IV but disproved at operation, a most severe and prolonged pylorospasm seems to be the only explanation. A complete organic obstruction at the pylorus in the newborn is a very rare occurrence. One such case has been reported by Tauroff and Sussman,[23]

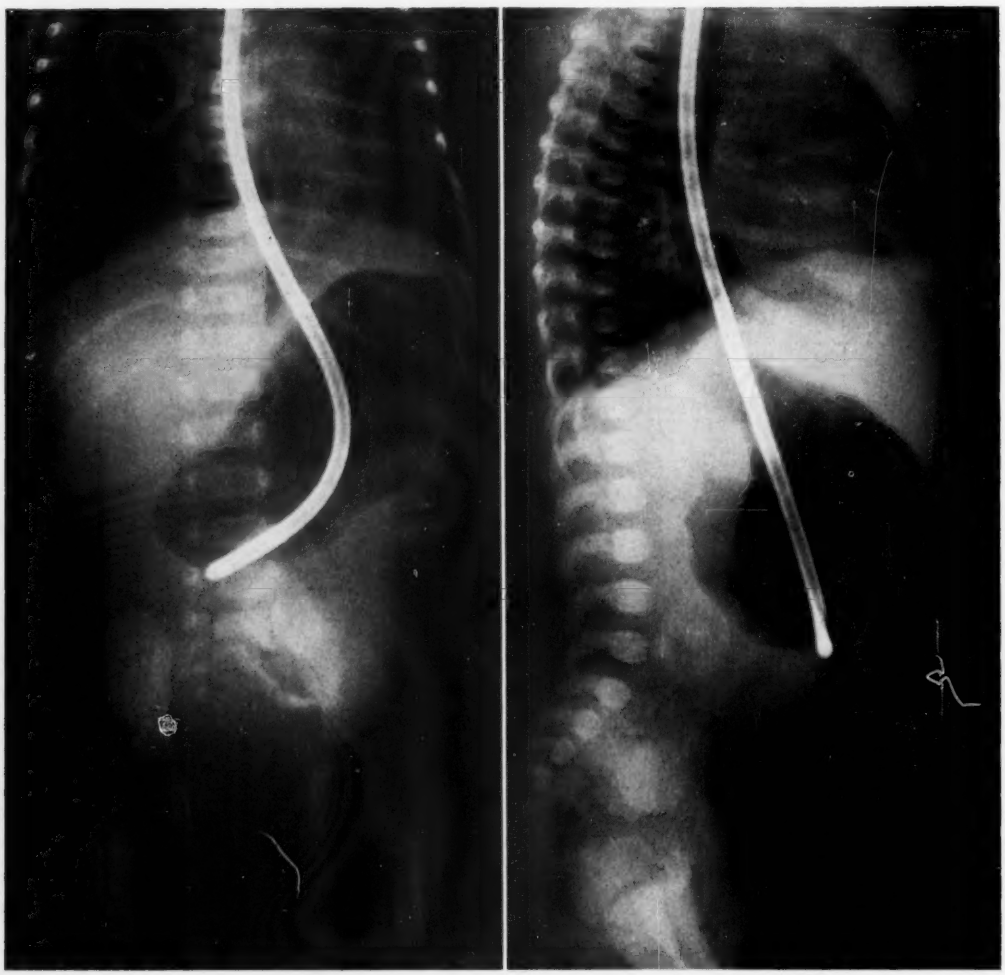

Fig. 3. Case iv. B.C.C. Birth weight 3 lb., 8½ oz. Gas-distended stomach with no gas in small or large intestine. The small amount of gas in the rectum may well have been introduced per ano. Hematemesis appeared at two days of age and later melena. Laparotomy disclosed no obstruction or volvulus, and gas could be manually expressed from the stomach through the duodenum. At autopsy there was a gastritis with multiple ulcerations.

and we recently encountered a similar condition at Harper Hospital, Detroit, Michigan.

Case v. M.I. This baby was delivered of a hydramniotic mother. Birth weight not given. The baby vomited all its feedings continually from birth. Four days after birth she was admitted to the hospital and physical examination revealed a dehydrated, malnourished infant. The abdomen was distended but no tumor felt. The rest of the examination was negative. Laboratory data revealed a CO_2 combining power of 50 volumes per cent, and white blood cell count of 16,400.

Three days after admission a roentgenogram of the abdomen (Fig. 4) revealed a distended stomach with no gas in the small intestine. A small amount of barium given at the time was still in the stomach three hours later. A diagnosis of complete obstruction was made. The patient was operated upon on the same day and a congenital prepyloric membrane was found about 1 cm. from the pylorus completely obstructing the gastrointestinal tract. This was incised and sutured, so that a patency was present. The patient was in good condition after the operation but still vomited all its feedings and required passage of a Levin tube. Another gastrointestinal series was done five days after operation which revealed a high degree of obstruction after six hours. Surgery

was again performed and gastrostomy revealed marked edema at the pylorus. A hemostat was passed through the edematous area to be certain of a patency and nothing else was done. About seven days after this operation the baby again began to vomit its feedings, which became progressively worse, requiring another operative procedure, at which time a gastrojejunostomy was performed. Vomiting gradually subsided and the baby improved rapidly until discharge in good condition on September 11, 1949, about two months following admission. At the time of the writing of this paper the child is doing excellently.

The extreme rarity of atresia of the stomach or pylorus makes this diagnosis very improbable on the basis of roentgenographic evidence of obstruction at the pylorus.

Hypertrophic pyloric stenosis, even when severe, does not, in our experience, prevent the passage of gas into the small intestine. Furthermore, the occurrence of this lesion in the newborn period is extremely rare, but we have seen one such case at Children's Hospital in which this unusual combination of circumstances was present.

Case vi. F.M. This baby weighed 7 lb., 9½ oz. at birth. Immediately following delivery, the baby began regurgitating about half of every other feeding. This became worse until it began vomiting after every feeding, the vomiting occurring anywhere from immedi-

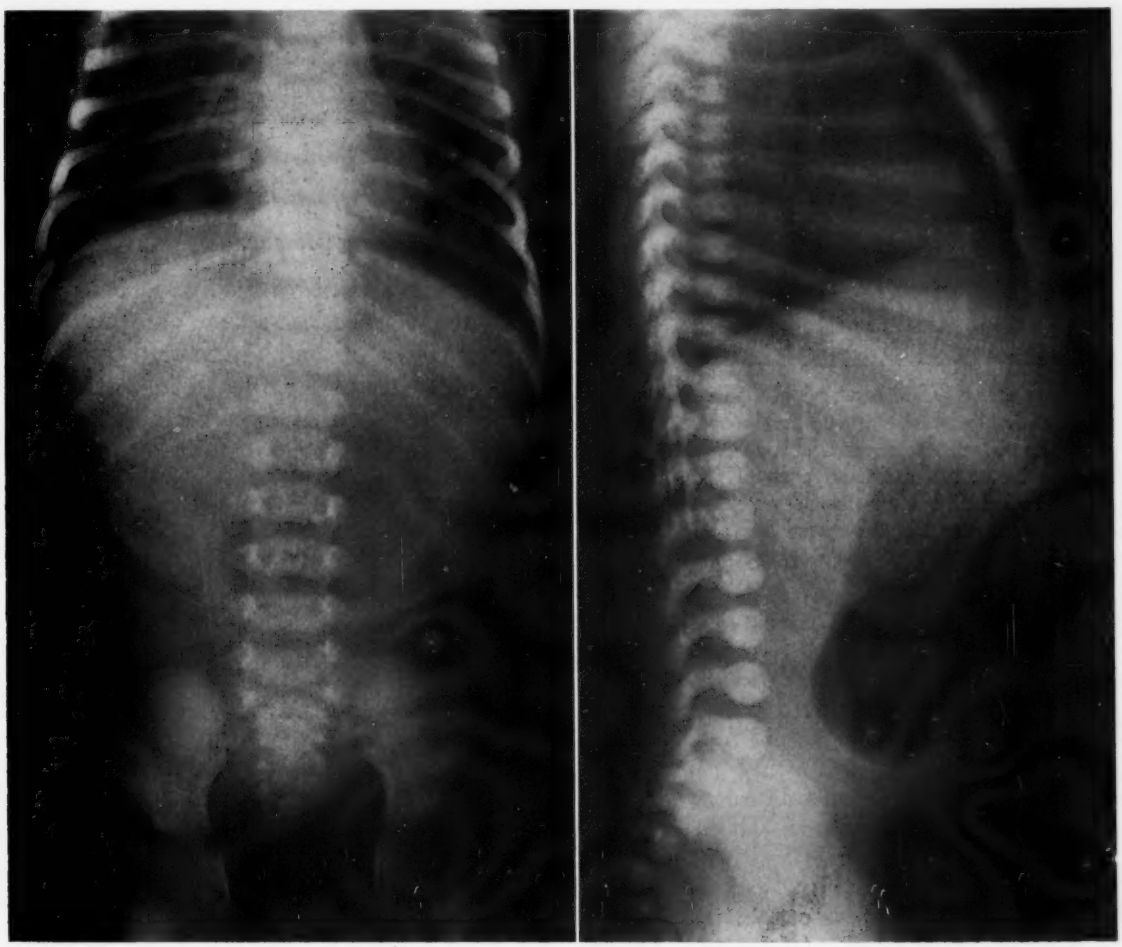

Fig. 4. Case v. M.I. Large gas-distended stomach with no gas in small or large intestine in a four day old infant hospitalized for vomiting. At operation a diaphragm was found occluding the stomach ½ inch proximal to the pyloric ring. Recovery followed incision and fixation of the membrane and later a gastroenterostomy.

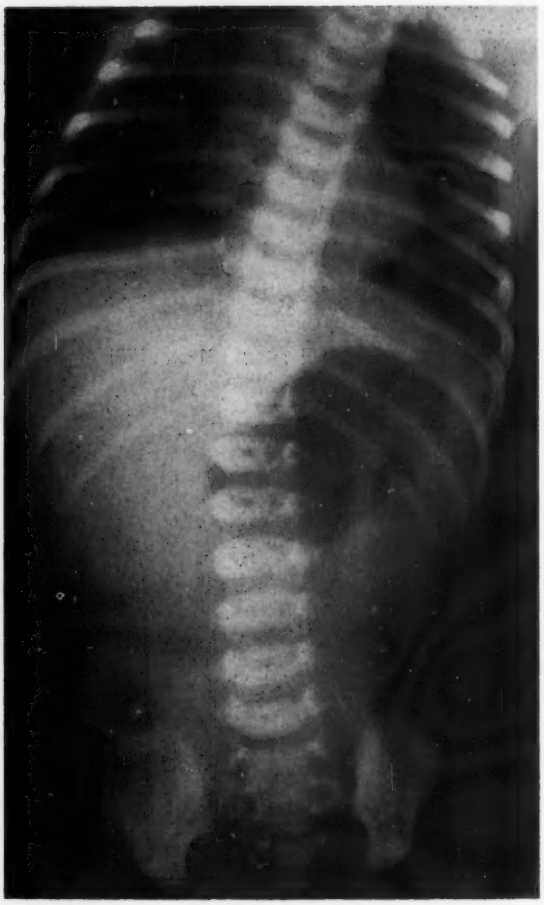

Fig. 5. Case VI. F.M. Birth weight 7 lb., 9½ oz. Gas-distended stomach with no gas in bowel observed in seven day old infant hospitalized for vomiting since birth. At operation a small pyloric tumor was found and a pyloroplasty performed. Blood cells were found in the spinal fluid, suggesting an additional factor of brain injury. There was an uneventful recovery.

ately after ingestion of the formula to twenty minutes later. Vomiting was usually projectile in character. Stools changed from pasty and yellow in character to mucoid and green on admission. On admission the physical examination revealed a chronically ill but well developed infant. Examination of the abdomen revealed a soft abdominal wall with no apparent tenderness. No definite mass could be felt. Laboratory findings were essentially negative.

Roentgen examination (Fig. 5) the following day revealed a gaseous distention of the stomach with no evidence of gas distal to the pylorus, except in the rectum, which was thought to be due to insertion of a rectal thermometer. A tentative diagnosis of pyloric stenosis or birth injury was made, and the infant was started on atropine and phenobarbital.

A lumbar puncture was performed on the day of admission, which was unsuccessful. The medication did not relieve the obstruction and the baby continued to vomit. Surgery was then performed and a small pyloric tumor was found and a pyloroplasty performed. Vomiting persisted to a small degree following surgery, but not as much as before. Another lumbar puncture performed on the fourth postoperative day was successful and the fluid examined revealed 180 crenated red blood cells per millimeter. No xanthochromia was present. It was felt at this time that cerebral birth trauma could still be part of the picture. The baby was discharged on the eleventh postoperative day in fair condition and vomiting only slightly.

At the time of this paper the family physician states that the child is in excellent health.

The final diagnosis in this case was a pyloric stenosis with a possibility of some cerebral birth injury being present.

Thus it would seem that roentgenographic evidence of a severe and prolonged pyloric obstruction, as indicated by a gas-distended stomach and absence of gas in the bowel in the newborn, is indicative of gastroduodenal ulceration if the possibility of hypertrophic pyloric stenosis or atresia of the pyloric area of the stomach can be excluded.

SUMMARY

1. A review is given of eighteen cases of gastroduodenal ulceration in the newborn at Children's Hospital of Michigan from 1940 to 1949.

2. The cases, with roentgen findings, are presented, with a discussion of differential diagnosis.

3. A high incidence of brain damage (50 per cent) and prematurity (66 per cent) associated with ulceration in the newborn was noted.

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ogy at Children's Hospital of Michigan, for his assistance and guidance in preparing this paper.

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CARCINOIDS (ARGENTAFFINOMAS) OF THE STOMACH*

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THOUGH the term carcinoid has been criticized, amended and substituted for by many authors, the name given by Oberndorfer[6] in 1907 still persists. Occasionally, this tumor is called argentaffinoma because of the peculiar quality of the cells of this tumor, namely, the affinity of its cytoplasmic granules for staining with silver salts.

Langhans[5] described the histopathology of this tumor in 1867. The work of Gosset and Masson[4] added considerably to the knowledge and information concerning carcinoids. They can be found throughout the gastrointestinal tract, but most commonly are seen in the appendix and small intestine. Its occurrence in the appendix is given as 0.5 per cent.[1] It is less frequent in the other parts of the intestinal tract. According to Plaut,[7] up to 1939 only 11 cases of gastric carcinoid had been reported, despite the fact that argentaffine cells, i.e., those presumed to give rise to carcinoid, occur in the stomach in large numbers.

The origin of these tumors is unknown. Various theories have been expressed. Some believe that they originate from pancreatic rests, others, from Auerbach's plexus, the sympathetic nervous system or other nerve tissue.

The tumors themselves usually appear as circumscribed firm nodules, often multiple, submucosal, and frequently project into the lumen of the intestinal tract.[3,11] The size may reach 4.5 cm. in diameter. They are yellow to grayish-white in color. On section the surface is usually yellow. The tumor cells originate in the deepest parts of the crypts of Lieberkühn (Kultschitzky cells) and grow in solid sheets or cords of various-shaped epithelial cells exhibiting indefinite cell boundaries and containing yellowish (chromaffin) granules. These granules very avidly reduce an ammoniacal solution of silver, staining black. Occasionally, the cells are arranged in acinar-shaped groups, i.e., an alveolar character. Rarely hypertrophic nerve filaments form an intrinsic part of the tumor. Danisch[2] believes that the tumor may incorporate cells typical of those found in the celiac ganglion. The structure of the cells also has been compared to those of a low grade melanoma or basal cell carcinoma because of the relative uniformity in size, regularity and opacity of the cells, and their lack of hyperchromatism, and so forth.

The malignant character of these tumors in locations other than the appendix is now well established. Cooke[1] in a comprehensive article reported 24 instances of malignant degeneration of carcinoids of the small intestine out of a total of 104 cases. Raiford[9] describes 1 malignancy of the stomach and 2 in the colon. Conservative reports reveal a 15 to 20 per cent incidence of metastasis in extra-appendiceal carcinoids with involvement of the regional lymph nodes, liver, lung, kidney or spread to adjoining tissue, but the facts have not been well publicized. Most authors[3,8,9,10,11] agree that all extra-appendiceal carcinoid tumors should be considered malignant. These potential neoplastic lesions, if permitted to grow unmolested, may eventually become malignant. It is only the low quality of

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their malignancy that makes them relatively benign.

Carcinoids may be the cause of lower abdominal pain in young adults and lead to a diagnosis of chronic appendicitis. They may on occasion produce intestinal obstruction. The lesion may be first evidenced by melena or hematemesis, as in one of the patients described below.

We are reporting 2 cases of carcinoid of the stomach discovered during gastrointestinal roentgen examination, reported as benign polyps, but correctly diagnosed by histopathological studies.

CASE REPORTS

Case 1. A white female, aged fifty-eight, was first seen by Dr. B. B. Crohn, New York City, on July 11, 1949, with a history of gastrointestinal difficulty of thirty-five years' duration, consisting of burning epigastric pain, belching, nausea and constipation. In 1943, a cholecystectomy for cholelithiasis was done with some relief, though the upper abdominal pain continued irregularly. Three months prior to admission, the pain changed in character, became more pressing, but non-radiating, and was relieved by small amounts of food. There were several episodes of vomiting without relief. The patient weighed 150 lb. and declared there had been no loss in weight. Two weeks previously, she had a hematemesis of "1 pint" of coffee ground material. Melena was also present. A gastrointestinal series taken two days later was reported negative. Physical examination showed a nervous female with poor general nutrition. Her blood pressure was 148/80, pulse 100, respiration 20, temperature 100° F. Heart and lungs were negative. Abdominal examination indicated a mass at the umbilicus about 6 cm. in diameter pulsating synchronously with the aorta, and not tender. Tarry stool was present on the examining finger. Laboratory reports were: hemoglobin 10.7, erythrocyte count 3.0 million, normal differential, urea nitrogen 13 mg., blood sugar 130 mg., chlorides 608 mg., CO_2 58.6 mg., serum proteins 7 mg. per 100 cc. The Wassermann reaction was negative; urine report was many bacteria, 10 to 20 leukocytes per low power field. Electrocardiogram showed T wave abnormalities. A gruel Rehfuss test resulted in free acid 30, combined 45. A gastrointestinal series done on July 11 revealed the following: A small flat diverticulum 1 cm. in diameter at the lower end of the esophagus, 2 cm. above the diaphragm. In the middle of the stomach, on the lesser curvature aspect, was a small filling defect 1 by 1.5 cm. in size. Peristalsis in this area was active. Within the area of radiotranslucency a small patch of barium was noted. The remainder of the stomach appeared normal. At two hours the stomach was emptying well. Impression: Small diverticulum at the lower end of esophagus; tumor of the stomach, either a polyp or a small carcinoma (Fig. 1 and 2).

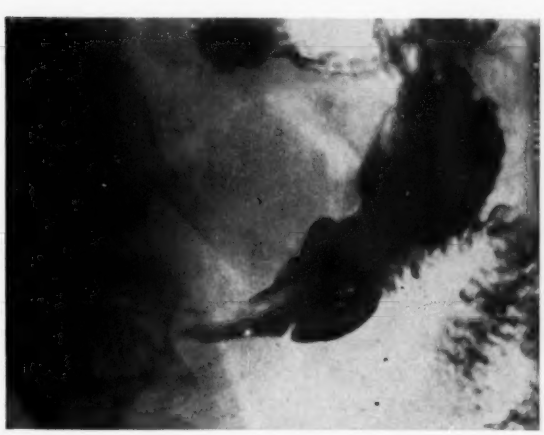

Fig. 1. A fairly smooth small filling defect is seen on the lesser curvature aspect slightly above the middle of the stomach.

Fig. 2. This film again illustrates the filling defect.

After thirteen days of preoperative preparation, on July 25, 1949, the patient was explored. A small soft nodule was felt on the

lesser curvature aspect at the middle of the stomach corresponding to the defect seen on the roentgenogram. The regional lymph nodes were not markedly enlarged. The liver was smooth. The operative diagnosis was gastric ulcer, probably benign. A high subtotal gastrectomy with Hofmeister modification was carried out. The patient received a transfusion

Fig. 3. A smooth filling defect is seen on the lesser curvature aspect of the prepyloric region of the stomach. The defect measures 1.5 cm.

of 50 cc. of blood. Convalescence was uneventful.

Pathology. The specimen consists of the distal 15 cm. of stomach and a duodenal segment of 1 cm. A small circular button-shaped mucosal lesion is found near the upper end of the resected stomach. It measures 1.7 cm. in diameter, is circular, with sharply rounded edges and exhibits a flat zone of mucosal ulceration 0.5 cm. in diameter in its central portion. The mucosa appears fixed over this area, but the mass itself is freely movable, not fixed to the muscularis. The section through the tumor shows the submucosa is occupied by a whitish, homogeneous, rubbery, firm tissue. At the proximal line of the resection, also on the anterior wall there is a bean-shaped mass 1 cm. in diameter which has the appearance of a myoma, and is localized to the submucosa. Histopathologic examination of the larger tumor mass with the mucosal ulceration revealed the typical characteristics of carcinoid. The smaller submucosal lesion was a myoma.

Case II. The patient was a female, aged forty-eight, who had a cholecystectomy for cholelithiasis in 1940 following several years of attacks of upper abdominal pain. This procedure relieved her for three years. Then upper abdominal pain of an intermittent nature recurred, becoming more severe as time went on. There had been no loss of weight over a period of one year. Physical examination was completely negative. Laboratory data revealed negative urine, erythrocyte count 4 million, leukocyte count 6,700 with a normal differential, non-protein nitrogen was 35.6 mg. per 100 cc. Roentgen examination was made to exclude gastrointestinal pathology, but revealed the following: The esophagus was normal. A small constant smooth filling defect 1.5 by 1 cm. in diameter was seen in the prepyloric region of the stomach on the lesser curvature. The mass produced a bulge in this region. No further abnormality was noted. At the end of four hours the stomach was empty. The impression was benign gastric polyp (Fig. 3). In March, 1947, this patient was operated on by Dr. Jacob Friedman of New York City.

The tumor mass was 1.5 cm. in size and covered by normal, freely mobile mucosa. Local excision was the procedure of choice since the surgeon felt this to be a benign lesion. The liver was smooth and no suspicion of malignancy was entertained. Histopathologic examination demonstrated carcinoid tissue. "The tumor consists of cuboidal cells, closely packed in columns. The nuclei are regular in size, small, round and contain numerous chromatin granules. The cytoplasm is abundant with acidophilic granules that stain black with silver salts. Some cells have small vacuoles at their bases. The stroma is dense and abundant, surrounding the columns of cells and widely separating the columns from each other. Neither the mucosa nor the serosa is involved. The muscularis shows moderate invasion from the submucosa. Diagnosis: Carcinoid."

In the opinion of the surgeon the symptoms of this patient were not due to the tumor, but to dense periduodenal adhesions between the gallbladder bed and other viscera.

CONCLUSION

Two carcinoids of the stomach both occurring in middle aged females are presented. One had definite signs due to mucosal ulceration of the tumor, namely, gross gastrointestinal bleeding with hematemesis and melena. In the other, the tumor was an accidental finding.

There was no evidence of malignancy in either case.

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ROENTGEN CHANGES IN THE UPPER INTESTINAL TRACT FOLLOWING THE USE OF CALCIUM CHLORIDE IN NEONATAL TETANY*

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CALCIUM chloride orally in doses as high as 6 to 8 grams daily in water or milk is an accepted form of treatment for neonatal tetany, although frequent reports in the literature state that it is irritating and may cause vomiting. Durlacher, Harrison and Darrow[2] are the first to demonstrate by autopsies on 2 infants that calcium chloride may have harmful effects on the stomach, duodenum, and jejunum. One of their patients was given 4 grams of calcium chloride in 25 cc. of water (16 per cent) by gavage for neonatal tetany. Two hours later the child had blood-stained vomitus and blood in the stools. The infant died thirty-six days after birth, and autopsy showed fibrinous adhesions covering the serosa of the stomach with a suppurative peritonitis. The mucosa of the stomach was replaced by opaque yellow calcareous plaques which were firmly attached to the submucosa. Similar changes were present in the duodenum and jejunum. Microscopically there was ulceration and necrosis of the gastric and upper intestinal mucosa with plaques of hyaline scar tissue, some of the scars containing calcium. Some of the arteries in the stomach and intestinal wall showed necrosis and calcification in the media and organizing and calcified thrombi within the vessels.

Their second patient was given 3 grams of calcium chloride in 18 cc. of water (16.6 per cent) by gavage two days after birth and this was followed by 1 gram in each feeding for one day. The infant died on the seventh day. Autopsy showed ulcerated mucosa in the fundus and along the greater curvature of the stomach. The bases of the ulcers were filled with a white opaque material having the consistency of egg shell—apparently calcium plaques. Microscopically there was necrosis of the mucosa and of some of the blood vessel walls.

Richards and Eriksen[7] have had a case which will soon be reported in which a newborn infant was given calcium chloride by gavage. Roentgenograms made approximately two and five days after calcium chloride was placed in the stomach showed no calcification in the intestinal tract, but films made nine days after the second examination showed calcification in the stomach, duodenum, and first portion of the jejunum. Calcification was also found in the esophagus at autopsy.

The following case also showed calcium in the stomach wall on roentgenograms, although this infant fortunately survived the severe effects produced by the calcium chloride on the gastric mucosa.

CASE REPORT

One week following a normal birth this infant had three convulsions after vomiting several times. The infant was hospitalized, and 2 grams of calcium chloride in 12 cc. of water (16.6 per cent) was given by stomach tube under the assumption that the convulsions were due to neonatal tetany. The baby had no more convulsions but vomiting and diarrhea became almost continuous after this. There was no blood in the vomitus or stools. Seven days after admission a flat piece of necrotic tissue approximately 4 by 5 cm. in size was discovered by the baby's head. This tissue was sent to the pathology department and microscopically it was thought to be membranous tissue from the stomach although accurate identification was impossible due to marked necrosis.

Thirteen days after admission a roentgenogram of the abdomen showed a coating of calcium outlining part of the stomach wall (Fig. 1). Re-examination of the abdomen six days

* From the Radiological Service of Drs. Roberts, Ogden, Hall, and Associates.

after the first examination (Fig. 2 and 3) showed a definite increase in the amount of calcification in or on the stomach wall. The baby's condition slowly improved and two months after admission comparison films showed a decrease in the amount of calcium in the stomach wall. The infant was discharged in good condition almost three months after admission. The child was in excellent health at eight months of age but a gastrointestinal examination then showed a constant constriction in the fundus of the stomach where the calcium deposit in the stomach wall had previously been most marked, evidently a cicatricial contraction (Fig. 4). There was no remaining evidence of calcium in the stomach wall on a preliminary film of the abdomen at that time.

It is theoretically possible that the calcium deposit outlining the stomach wall in such cases as the above could represent calcium derived from the calcium chloride injected into the stomach by gavage, but with such a theory it is necessary to assume that the calcium chloride either becomes deeply imbedded in necrotic intestinal wall after producing the necrosis or that the calcium is precipitated as an insoluble calcium compound in or on the intestinal wall. A mere coating of calcium chloride on the intestinal wall would disappear within a very short time since calcium chloride is relatively soluble, whereas in the above case calcium could still be seen outlining the stomach wall more than two months after it was first seen on the roentgenograms.

Contrary to this theory is evidence to indicate that the deposite of calcium in the intestinal wall in these cases occurs some

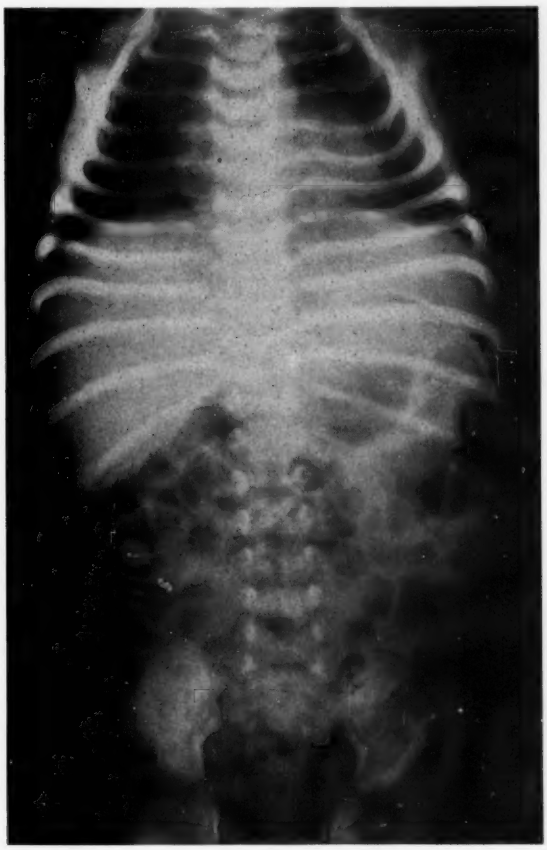

Fig. 1. Calcium outlining part of the stomach wall thirteen days after injecting 2 grams of 16 per cent calcium chloride into the stomach.

Fig. 2. Film made six days after the first examination showing an increase in the amount of calcium in the stomach wall.

Fig. 3. Lateral film made at the same time as Figure 2 showing the calcification in the stomach wall more clearly.

some time after the tissues have become necrotic and not immediately after calcium chloride is injected into the stomach. This is apparent in the case of Richards and Eriksen[7] where films on the second and fifth days after calcium chloride was placed in the stomach were negative, but films on the fourteenth day showed calcium in the intestinal wall. Even though the exact time at which calcium first appeared in the stomach wall in our case is not known the evidence would point to the same conclusion since there is a definite increase in the amount of calcification in the stomach wall between the first (Fig. 1) and second (Fig. 2 and 3) roentgen examinations. Microscopic sections of the stomach in the cases autopsied by Durlacher *et al.*[2] showed calcified thrombi within the lumen of blood vessels as well as calcium in the media of vessels, which would also indicate a secondary deposition of calcium in the necrotic tissues rather than an original deposit of calcium derived from the calcium chloride injected into the stomach. The deposition of insoluble calcium compounds in necrotic tissue is of very common occurrence and the process is familiar to all physicians, although the way in which it occurs is not clearly understood.

Hamilton[4] has expressed a theory which may explain the necrotizing action of calcium chloride on the intestinal mucosa. He thinks without having performed any experiments for proof, that the calcium chloride in the stomach may undergo some hydrolysis with the formation of a certain amount of hydrochloric acid. This hydrochloric acid may then penetrate into the intestinal wall and produce the necrosis.

Fig. 4. Film showing constant constriction in the fundus of the stomach approximately eight months after the first examination.

Experiments by Durlacher *et al.* on rabbits not only demonstrated the harmful effects of calcium chloride on the stomach but they also showed that these effects were more marked in very young rabbits than in older rabbits. It is quite probable that infants in the neonatal period may likewise be more susceptible to calcium chloride than older children or adults. The author has had personal experience with a man of middle age who took 45 grams of calcium chloride by mouth daily for more than a year without any apparent harmful effects.

SUMMARY

Calcium chloride even in small doses may have very harmful effects on the upper intestinal tract of newborn infants, and necrosis of tissues and death have been reported after its use in neonatal tetany. Secondary calcium deposits in the necrotic tissue in the esophagus, stomach, and jejunal walls followed later by cicatricial contracture may also occur after its use.

The author is indebted to Dr. Howard Brayton whose case is reported in this article.

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THE ROENTGEN DEMONSTRATION OF THE DEPOSITION OF COLLOIDAL THORIUM DIOXIDE (THOROTRAST) IN THE GALLBLADDER WALL

WITH REPORT OF A CASE*

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A SEARCH of the literature to the time of the first reported use of a thorium dioxide sol (thorotrast) in 1929, by Radt and Oka,[23] fails to reveal a report of a case in which the material was concentrated in the gallbladder wall as well as the usual sites of the reticulo-endothelial system in the liver, spleen, lymph nodes, and bone marrow.

At this institution the use of thorotrast in diagnostic roentgenology is limited to extremely puzzling cases in patients of the older age groups, where by its use a major surgical procedure may either be prevented or expedited. We have used this material in 7 cases in the past three and a half years out of approximately 100,000 total roentgen diagnostic examinations. By careful selection of the patients with a view to the expected help of the procedure and also confining it to persons past fifty years of age, we feel that any late effects that may occur will be minimized.

Rigler and others,[20] in 1935, reported on a group of patients three and a half years after the injection, at which time there was some redistribution of the thorium into the lymphatics of the liver and the hepatic lymph nodes, but no untoward findings were reported.

Jacobson and Rosenbaum,[12] in 1938, reported the autopsy findings of an individual who had been given thorotrast five years before death. They found considerable fibrosis in the liver, spleen, and the perihepatic lymph nodes, which they ascribed to the longstanding chronic radiation from the thorium. They also found that the ashed material of the liver retained approximately 27 per cent of the gamma-ray activity of the original thorotrast injected five years before.

In 1937, Reeves and Morgan[19] conducted a survey of the retention of thorium dioxide by the reticulo-endothelial system of patients over a four-year period. Their determinations were made with a Geiger-Müller counter, and at the end of four years, approximately 80 per cent of the original radioactivity was still present.

In 1939, Herrington and Huggins,[8] in an experimental study in dogs, found that the thorium had disappeared completely from the blood stream by twelve hours after the injection. The rate of absorption was affected only slightly by such procedures as bilateral nephrectomy, splenectomy, total pancreatectomy, and partial hepatectomy. They felt that the reticulo-endothelial system has a great functional reserve, and it is quite difficult to interfere with the capacity of its cells.

In 1939, Pohle and Ritchie,[18] in an experimental study on dogs, autopsied the animals two years after the injection. The only histological changes they considered to be referable to the presence of thorotrast consisted of vacuolar degeneration of the liver cells.

Yater and Coe,[23] in 1943, reported on

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their experiences with more than 300 patients over a ten year period, and they stated that they found no unusual late manifestations following the administration of the dye up to ten years, at which time 9 cases were still living and well.

In 1947, MacMahon and others[15] reported a case of a fifty-eight year old female, who was given 75 cc. of thorotrast to outline a gumma of the liver. Ten years later, the patient died of a primary tumor of the liver with metastases. The microscopic picture showed the tumor to resemble one originating from Kupffer cells. Much thorotrast was found in the liver, the spleen, the lymph nodes, and the bone marrow.

In 1950, Henry, Kaplan and Thomas[9] reported on the experiences with thorotrast of 132 radiologists obtained by questionnaires. These radiologists reported to them that they had used thorium dioxide sol in 4,325 cases in addition to those previously reported elsewhere. From this response, 2 unpublished cases of malignancy were found.

Our review of the literature, plus the findings by questionnaire of Henry, Kaplan and Thomas, leads us to believe that the present case is unique in the history of experiences with colloidal thorium preparations.

CASE REPORT

Case 1 (No. 194363). O. E. R., white male, aged fifty-five, railroad brakeman. Admitted to the Surgical Service of the Louisville General Hospital on February 24, 1950, with the following positive findings:

Chief Complaint. "Pain in my stomach."

Present Illness. Began suddenly five days previously (February 19, 1950) when he was awakened with constant right epigastric pain. He was nauseated but did not vomit. On February 20, 1950, the patient presented himself in the Emergency Room, where he was given unknown medication and referred to the Surgical Clinic. Following his clinic visit, he was admitted to the hospital with little change in his condition from that at the onset. No chills or fever were experienced.

Previous History and Review of Systems. Patient stated he had had no previous similar episodes. No history of jaundice or clay-colored stools. He has had normal bowel habits with no constipation or melana. Has had some gaseous eructations, relieved by "soda and vinegar." No radiation of pain to the shoulder or any food intolerance was noted.

The remainder of the past history is noncontributory.

Physical Examination. Temperature, 99.6° F.; pulse, 100; respiration, 22; blood pressure, 134/76.

Well developed and well nourished white male in moderate distress. The skin was not remarkable.

There was spasm over the entire right abdomen, most marked in the upper half. An ill-defined tender mass was palpated in the right upper quadrant. There was moderate rebound tenderness in this same area. The liver and spleen were not felt. Peristalsis was normally present. No evidence of free fluid was found in the abdomen.

Laboratory Studies. Urinalysis: not remarkable. White blood cell count, 11,700 ,with 79 per

Fig. 1. Plain film of abdomen, made on February 27, 1950 (before injection of thorotrast). Note absence of any unusual shadows.

Fig. 2. Film of abdomen made twelve hours and thirty minutes after injection of thorotrast. Note the thin linear U-shaped shadow (not retouched), medial to the right lobe of the liver. Residual barium is in the transverse colon.

cent polymorphonuclears, 17 per cent lymphocytes, and 3 per cent monocytes. Red blood cell count, normal. Blood chemistry: albumin, 3.9 gm.; globulin, 2.6 gm.; total proteins, 6.5 gm.; serum bilirubin, 0.4 mg.; cholesterol, 206 mg.; thymol turbidity, 1.0; cephalin flocculation, negative.

Roentgenographic Studies. February 27, 1950: Attempted cholecystogram with six tablets of priodax failed to visualize the gallbladder (Fig. 1). No radiopaque stones were seen.

February 28, 1950: Another cholecystogram with twelve tablets of priodax again failed to visualize the gallbladder. Impression: Nonfunctioning gallbladder.

February 28, 1950: Retrograde pyelographic studies were within normal limits.

March 1, 1950: Colon study showed inferior displacement of the hepatic flexure of the colon, suggesting a mass in the region of the right lobe of the liver. No intrinsic pathology of the colon was seen.

March 2, 1950: Upper gastrointestinal study showed no evidence of pathology.

March 2, 1950: At 8:10 P.M., 75 cc. of thorium dioxide sol (thorotrast) was administered intravenously on the ward in 1,000 cc. of normal saline.

March 3, 1950: At 8:45 A.M., twelve hours and thirty minutes following the administration of the colloidal thorium dioxide, films were made of the abdomen (Fig. 2). Good visualization of the right lobe of the liver and the spleen was obtained. The tip of the liver was within 1.5 cm. of the crest of the right ilium. There was noted a thin U-shaped line of increased density adjacent and parallel to the medial aspect of the right lobe of the liver. This linear shadow had its inferior tip approximately 2.5 cm. below the crest of the right ilium. This was thought to be (1) possible deposition of thorium dioxide in the wall of a distended gallbladder; (2) possible abscess of an anomalous Riedel's lobe of the liver.

Clinical Impression. (1) Possible penetrating

Fig. 3. Film of abdomen (not retouched), made on March 23, 1950, three weeks after the injection of thorotrast. Note the decreased size of the gallbladder as compared with Figure 2.

or perforated peptic ulcer; (2) possible distended gallbladder with acute cholecystitis; (3) ill defined mass of upper abdomen on right. Neoplasm to be excluded; (4) possible liver abscess.

Course. Symptomatic medication was administered with gradual improvement in the patient's condition. No new or outstanding events occurred during this hospitalization. The patient was discharged to home on March 3, 1950, to return for cholecystectomy and exploratory laparotomy when acute symptoms had subsided.

Readmission Note. Patient was readmitted on March 22, 1950, for laparotomy. No unusual events had occurred in the interim.

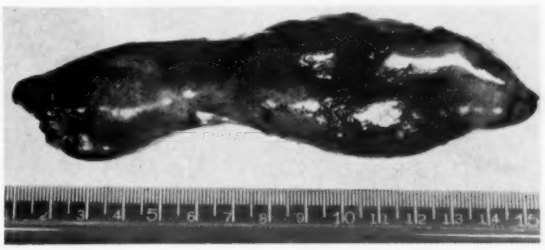

Fig. 4. Photograph of gross specimen following cholecystectomy.

Physical Examination. Failed to locate the previously described mass. Slight tenderness was elicited in the right upper quadrant of the abdomen.

Laboratory Tests. Non-contributory.

Roentgenographic Studies. March 23, 1950: Survey film of the abdomen (Fig. 3). The right upper quadrant of the abdomen showed the thin linear shadow to be still present, but it occupied a smaller area and is now definitely thought to represent thorium in or on the gallbladder wall. If that is true, the gallbladder is much smaller than at the previous examination of March 3, 1950.

March 23, 1950: Repeat cholecystogram failed to show priodax in the gallbladder.

Surgical Procedure. March 25, 1950. Laparotomy: The abdomen was opened under general anesthesia through a right upper quadrant transverse incision, transecting the right rectus muscle. The gallbladder was found to be large, tense, slightly edematous, and filled with multiple stones of all sizes. The common duct was palpated and felt normal. No evidence of any stone formation or dilatation was found. No other abnormal conditions were found in the

Fig. 5. Reproduction of roentgenogram of gross specimen. Note the diffuse distribution of the radiopaque substance throughout the gallbladder wall. Several large stones are seen, but they did not have sufficient opacity to be seen in vivo.

abdomen. The cystic duct and artery were exposed, ligated, divided, and the gallbladder was removed by sharp dissection. The peritoneum of the bed was immediately closed. A Penrose drain was left in Morrison's pouch, and the incision was closed in layers. An appendectomy was also done. The patient was returned to the ward in good condition.

An uneventful postoperative recovery was made. The patient was discharged as well on March 30, 1950.

Pathologic Description. Gross: The gallbladder measures 14 by 5 by 5 cm. There are thick scars on the serosal surface and numerous broken blood vessels which give it a red color. The gallbladder wall measures 4 mm. in thickness and the mucosa is very slightly granular and has a golden tinge. A greenish, mucoid se-

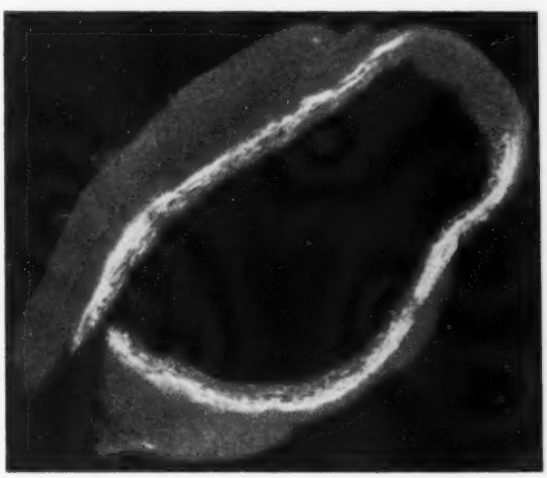

Fig. 6. Roentgenogram of cross section of gallbladder wall, showing the location of the thorotrast in relation to the mucosa.

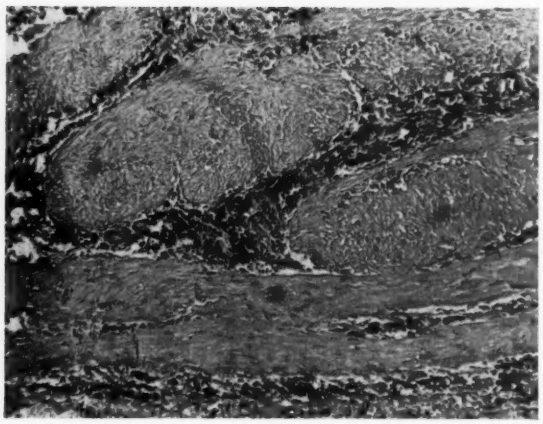

Fig. 7. Low power photomicrograph of gallbladder wall, showing the dark-staining macrophages between the muscle bundles.

cretion is present within the lumen in addition to numerous multifacetted black and gold stones, the largest of which measures 2.5 cm. in maximum diameter.

Microscopic: Sections of gallbladder stained by hematoxylin and eosin reveal focal ulceration of the mucosal epithelium. The lamina propria is moderately and diffusely infiltrated by lymphocytes, plasma cells, few eosinophils and occasional neutrophils. There is no evidence of cholesterosis. There is recent focal hemorrhage, moderate in the lamina propria, slight in the muscularis, and marked in the subserosa. There are no areas of free hemosiderin pigment. The muscular layer is thickened. Some pseudogland penetration of the muscularis forming Rokitansky-Aschoff sinuses is seen. In the interstitial fibrous connective tissue between muscle bundles and to a lesser extent peripheral to them are masses of macrophages containing within the cytoplasm grayish-purple to grayish-brown coarse granules (Fig. 7). There are several small arterioles and venous branches beneath the muscular layer which show a marked subendothelial proliferation of young fibrous connective tissue with some extension into the muscular layers of the vessels. The vessel lumens are markedly narrowed and eccentric (Fig. 8). The most pronounced sclerosis is seen in those vessels where overlying ulceration of the mucosa is most marked, and this, too, is where the greatest concentration of macrophages is situated. The subserosa is thickened by edema and fibrous connective tissue.

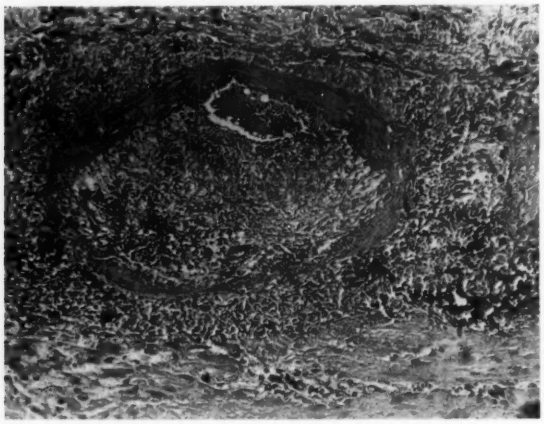

Fig. 8. Low power photomicrograph showing marked narrowing and eccentricity of a blood vessel lumen. The very dark-staining cells present are macrophages containing thorotrast.

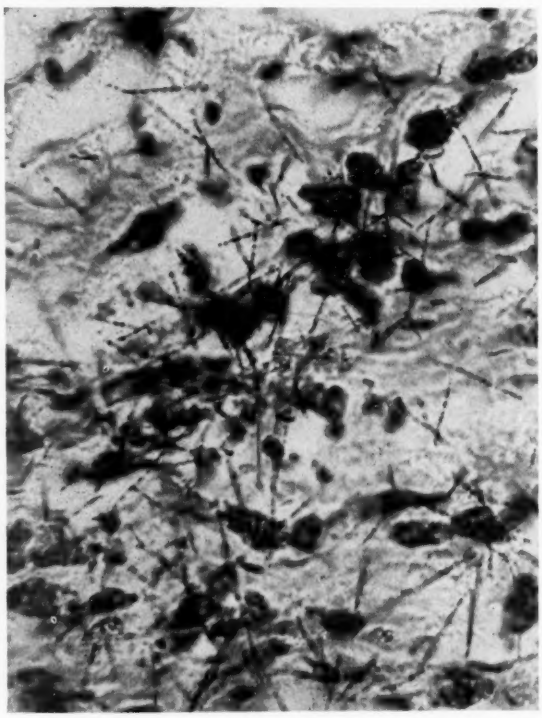

Fig. 9. Radioautograph with medium magnification, showing the alpha tracks closely associated with and arising only from the macrophages.

Frozen sections stained for fat with scharlach R reveal in some of the macrophages tiny granules of red. These do not correspond to the coarse granules but lie between them. Sections stained by potassium ferrocyanide and hydrochloric acid for hemosiderin show grayish-green to grayish-blue granules within the macrophages corresponding to the coarse granules described in the hematoxylin and eosin stained sections.

Radioautographs. The radioautographs were prepared by the technique of T. C. Evans[2,3] and Endicott and Yagoda.[1] Sections 3μ in thickness were placed on NTA (nuclear tract, alpha) plates and developed at intervals of one, three, and six weeks. Hematoxylin and eosin stains were used.

Following this preparation the radioautographs were found to contain many alpha tracks in the areas where the macrophages were present (Fig. 9 and 10). The short straight lines of black silver grains represent the paths of the emanating alpha particles.

DISCUSSION

Normally, in thorotrast studies the gallbladder is not outlined. Here there was something out of the ordinary. Thorotrast picked up by macrophages has frequently been described in other tissue following extravasation. The question here is why were the macrophages present in the gallbladder. The overlying mucosa was ulcerated and the lamina propria was chronically inflamed. The gallstones were mixed, containing a considerable amount of cholesterol. Although cholesterosis of the gallbladder was not present grossly, ulcerated mucosa adjacent to the cholesterol stones may have excited macrophagic response. Also minute amounts of fat, or lipoid, were present in some macrophages, but the concentration of macrophages was deep in the muscular layer not near the surface. In severe chronic inflammation with tissue necrosis, macrophages may be abundant, but the inflammation is not thought to be sufficient to explain this marked concentration of phagocytes.

The blood vessels were markedly altered near the greatest concentrations of these cells and the sections stained for hemosiderin were positive; these findings would suggest that interstitial hemorrhage had occurred at some time previously. This blood would account for the necessary presence of the macrophages before the time of the intravenous administration of the thorium dioxide. The subsequent takeup of the circulating thorium particles is in keeping with the normal action of the macrophages as a part of the reticulo-endothelial system. The number of these cells and the amount of their ingested thorium dioxide was sufficient to become visible roentgenographically along with other organs, the liver, the spleen, etc., that normally contain relatively large groups of reticulo-endothelial cells.

The unusual local concentration of these cells and their takeup of this heavy metal

Fig. 10. A single isolated macrophage with many refractile granules and the alpha tracks radiating from this single cell. Other type cells in the same field show no evidence of radioactivity.

should produce some interesting conjectures concerning selective deposition of materials in various tissues and organs.

SUMMARY

1. A brief review of the literature concerning the deposition and retention of intravenous colloidal thorium dioxide (thorotrast) is presented.

2. A report is given of the first case of roentgenographically demonstrated thorium dioxide deposited in the gallbladder wall and proved with radioautographs.

3. The probable pathologic explanation is that of previous interstitial hemorrhage

followed by macrophages which acted as part of the reticulo-endothelial system when the thoridum dioxide was injected.

The radioautographs were prepared with the technical assistance of John Gallimore under the direction of Dr. H. D. Kerman, of the Staff of the Medical Division of Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee.

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Vol. 66, No. 2

EPIPLOPERICOLITIS

THE SIGNIFICANCE OF ITS ROENTGENOLOGICAL DIAGNOSIS

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THERE is a type of perivisceritis among the various kinds generally spoken of that is seldom mentioned. We refer to what the French School in 1892 termed "tumoral epiploitis." In what little bibliography there is on the subject, it is found under the headings of "inflammatory pseudotumor of the colon," "epiplopericolitis," "granuloma of the colon," "pseudotumoral epiploitis or Braun's tumor."

In fact, it was Braun who, in 1909, gave a full description of these pseudocolonic tumors. He emphasized its nonspecific character, but only inflammatory. Later, in 1920, Tietze described its clinical picture, and in 1934 Anschutz, taking up the subject again, clearly presented the surgical aspect of this benign neoformation.

Of all the names under which it is known, we believe that epiplopericolitis is he most appropriate, for it refers to the one anatomic element that intervenes in the process—the epiplon—as well as its situation around the colon—pericolitis.

ETIOPATHOLOGY

The epiplon, which possesses great mobility, fulfills an important defensive role in all the infectious processes of the abdominal viscera, as has been pointed out by Walther and Nario.

A surgical traumatism, especially as a result of the extirpation of an acute appendix, that is, when an active process is present, may give rise to a process of an indefinite character and of a peculiar clinical etiological relation, which the French School attributed to epiplopericolitis, giving it the name of "extensive ascendant postappendicular epiplopericolitis." Our Case 1 (Fig. 1 and 2) belongs to this etiopathology.

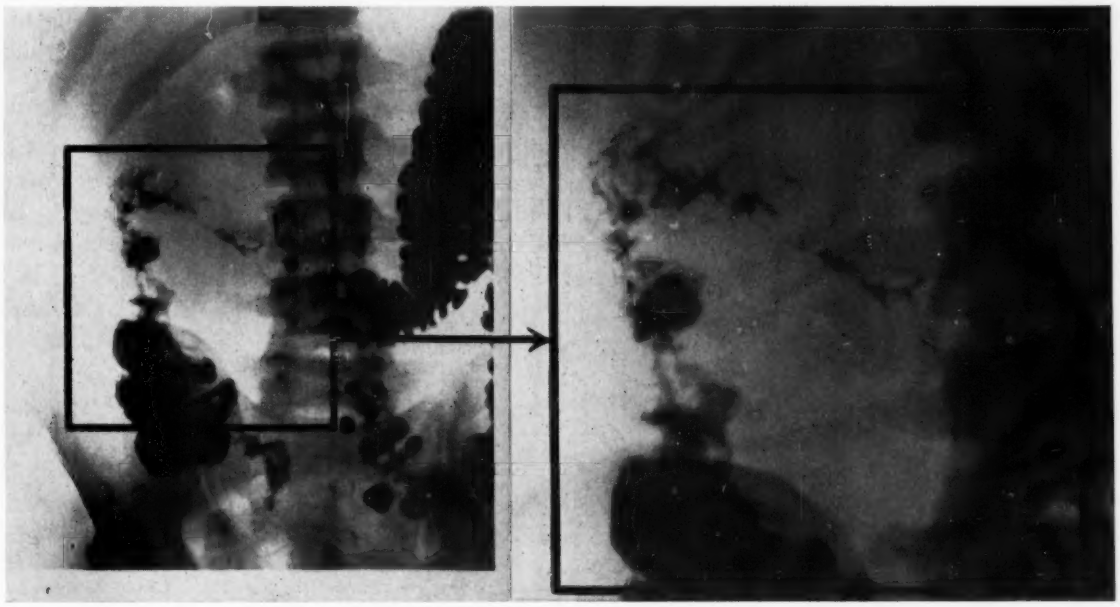


Fig. 1. Case 1. Postappendectomy epiplopericolitis. The roentgenological image obtained by the oral opacification method reveals a lacunar image which extends to the ascending colon and right half of the transverse colon the aspect of which appears to belong to a neoplastic process.

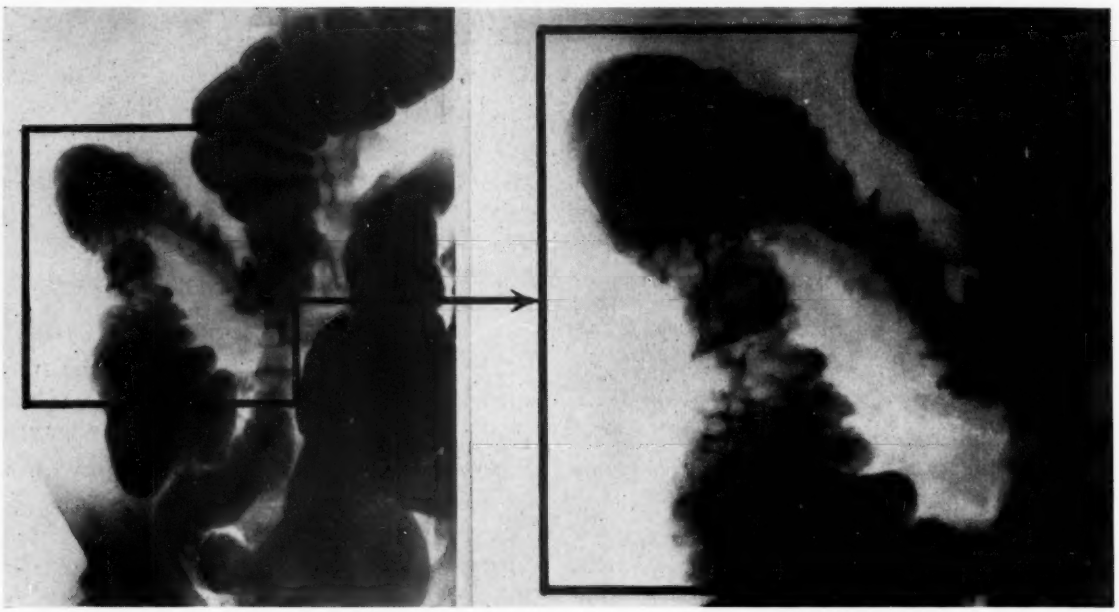
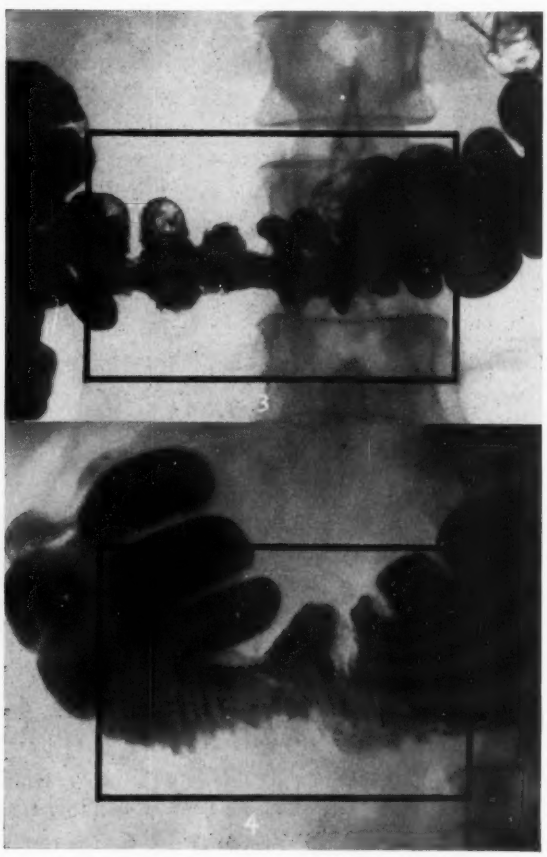


FIG. 2. Case 1. Postappendectomy epiplopericolitis. Same case, opacified by enema, reveals the integrity of the colon mucosa and the funnel shape of the stenosis.



But even a simple surgical traumatism, the extirpation of an appendix in good condition, for example, may cause an epiplopericolitis. Three of Nario's cases are of the type; the appendectomy had been carried out without the least surgical inconvenience, with little local injury. Thus, an epiplopericolitis may develop without any active inflammatory focus.

Certain foreign bodies, especially fish bones, may also cause an intense epiploic reaction in the colon. One of the two cases recently reported by Rückensteiner is of this type; a tumor situated in the middle of the transverse colon after a surgical operation revealed the presence of a fish bone, 25 mm. long. One of our cases (Case 11) resulted from the same cause, and was also located in the transverse colon (Fig. 3 and 4).

FIG. 3 and 4. Case 11. Epiplopericolitis due to a fish bone. While Figure 1, obtained by oral opacification does not reveal any alteration of the colon, the image corresponding to Figure 2, opaque enema opacification shows the typical roentgenological image of an epiplopericolitis: preserved mucous membrane, shortening of the inferior limit of the colon, funnel shape stenosis.

Cholecystopathies, especially lithiasic cholecystitis, may also give rise to an epiplopericolitis, the epiploic reaction in the transverse colon depending upon the anatomic situation of the original focus.

Our Case III (Fig. 5 and 6) is an example of this etiology.

Surgical Traumatisms

Causes of the epiploperi-colitis	Foreign bodies Inflammatory processes	Colonopathies Cholecystopathies Appendicitis Surgical interventions

Obviously, the constitutional factor must be taken into account, especially in cases where the operation is done under normal conditions. There are, in fact, constitutional habits, fibroplastic diathesis, especially in tall thin persons, which are predominantly sympathicotonic subjects who possess mesodermic tissues with a potential capacity to react in an abnormal manner, even to minimum stimuli.

According to Nario's classification, which specifies two types of epiploitis—the reactional and the non-reactional or intra-omental—epiplopericolitis belongs to the first type. It is therefore a secondary epiploic reaction of a defensive epiploitis, provoked by the presence of, and due to an abdominal inflammatory focus. It is but the result of the defensive capacity of all the peritoneal sheath.

SYMPTOMATOLOGY

The clinical symptomatology is very atypical, variable and confusing, difficult to diagnose correctly, especially in the absence of any trace of surgical traumatism.

(1) Loss of weight, loss of appetite, dyspepsia, general breakdown, chills and perspiration.

(2) Colic pains, localized or diffuse, variable localization and intensity.

(3) Abdominal distention produced by meteorism, with or without constipation. Intestinal subocclusion which may turn into complete intestinal occlusion.

The main symptom is the existence of the tumor. Its situation depends on the original point of the inflammatory focus. According to Nario, it manifests itself in two different aspects: (a) neoplastic aspect: Of variable extension, unequal consistency, non-uniform and painful to the touch; (b) inflammatory aspect: When developing toward suppuration it becomes soft; it is then a tumor with a marked degree of softness, less fixed, of an irregular surface and extremely painful to the touch.

It may break down, perforating into the neighboring organs or through the anterior abdominal wall, as occurred in our Case III. It may disappear as Braun and Ashurst had foreseen.

ROENTGENOLOGICAL DIAGNOSIS

Although Mirizzi believes that laparotomy solves the unknown in the diagnosis, we believe that the roentgenological appearance is so typical that its diagnosis is quite possible by this method of examination.

Epiplopericolitis is often mistaken principally for carcinoma of the colon, as occurred in one of Rückensteiner's two cases. However, roentgenological aspects of both diseases are fundamentally different. Epiplopericolitis presents the following roentgenological signs:

(1) *Stenosis*. The pericolic process causes a stenosis of the intestine owing to an edematous infiltration and scar retraction. It may completely surround the circumference of the intestine as in our Cases I and III (Fig. 1, 2, 5 and 6), or localize itself only in a segment of the intestine, as in our Case II (Fig. 3 and 4). Thus, we must call attention to an important fundamental roentgenological fact. There is a discrepancy between the stenotic image obtained by oral opacification and the one observed by the opaque enema. The first manifests itself, as in Cases I and III (Fig. 1, 2, 5 and 6) up to the point of simulating (Fig. 1 and 5) a neoplastic or specific process. Sometimes, the stenotic image is unobtainable by the oral method (Fig. 3), while with the opaque enema technique we observed a process situated in the lower

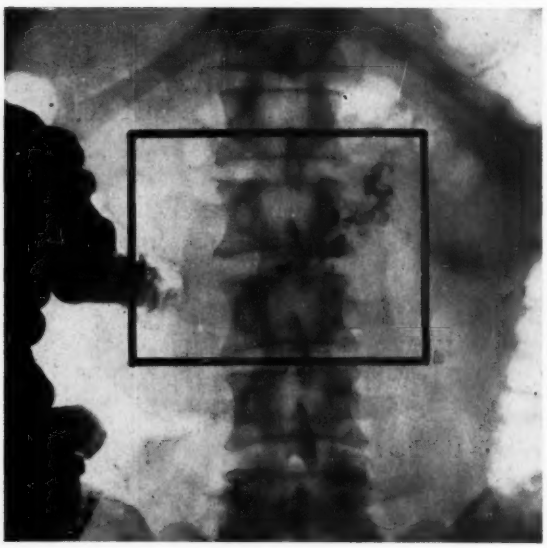


FIG. 5. Case III. Epiplopericolitis due to lithiasic cholecystitis. The roentgenological image by oral opacification shows a stenosis at the level of the transverse colon with no definite characteristics.

border of the colon which the first method did not even cause to be suspected (Fig. 4).

This contradiction between the two classic techniques of opacification of the large intestine and which, for us, constitutes a fundamental important fact in the diagnosis, applies equally well to other aspects of the roentgenological examination of epiplopericolitis.

(2) *The funnel shape image.* The stenosis gradually increases; it reaches its maximum in the middle. In this way, the narrowed intestinal space results in an image which may be compared to two funnels or cones opposed by their angular vertexes (Fig. 2, 4 and 6). It is an important sign, as the carcinomatous process of the colon does not present such a regular and symmetrical image.

(3) *Tunnel.* While in epiplopericolitis, the tunnel-shaped image formed by the process of the colonic stenosis is more centered and regular, in the neoplastic process its configuration is not uniform.

(4) *Aspect of the mucous membrane.* The stenosis is the result of an external compression of a perivisceral reaction around the colon. This extrinsic character—extracolonic—of the process is shown by a fundamental roentgenological sign: the preservation of the mucous membrane of the colon; in the neoplasias, on the contrary, the mucous membrane appears destroyed. In fact, in epiplopericolitis the mucous membrane remains intact, although modified in its course, disposition and folds. As the segment of the colon, in which the process occurs, shortens itself by scar retraction of the epiploic tissue, the folds of the mucous membrane appear crowded and retracted and consequently increased in number (Fig. 2, 4 and 6). Their position is mainly perpendicular with respect to the longitudinal axis of the in-

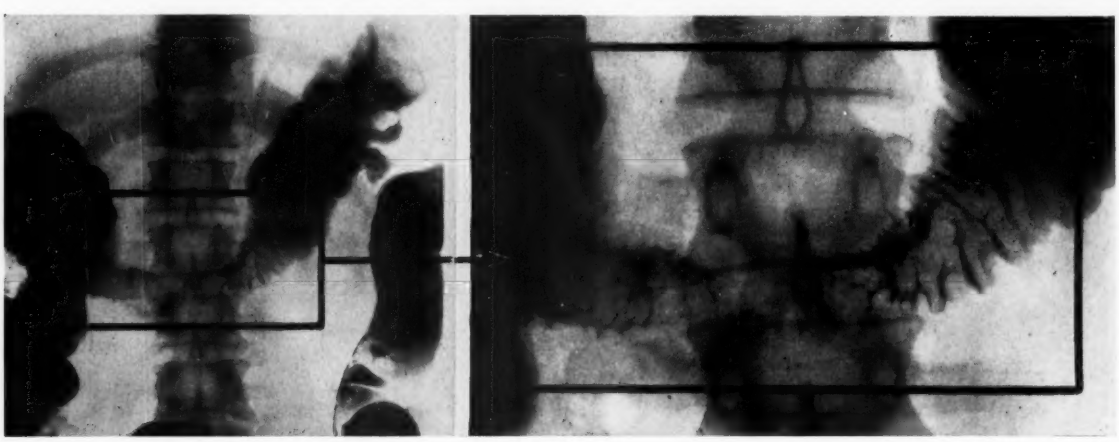


FIG. 6. Case III. Epiplopericolitis due to lithiasic cholescystitis. The image by rectal opacification shows the proper characteristics of an epiplopericolitic process.

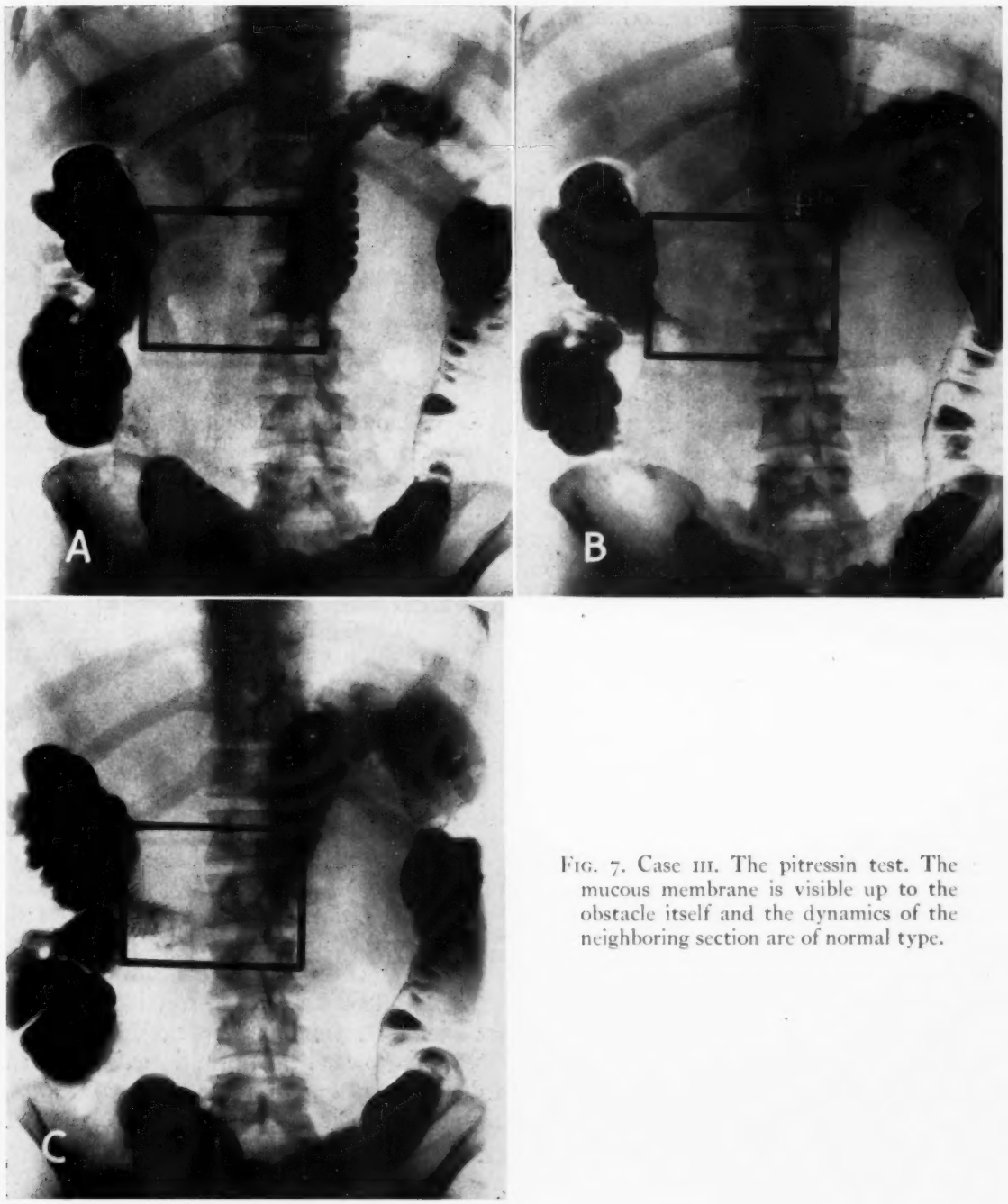


Fig. 7. Case III. The pitressin test. The mucous membrane is visible up to the obstacle itself and the dynamics of the neighboring section are of normal type.

testine. This appearance of the mucous membrane differs fundamentally in the two methods of opacification of the intestine. While in the oral method the image is typically lacunar, suggesting a destructive process (Fig. 1 and 5), the enema method of examination clearly reveals the preservation of the mucous membrane; this image we propose to term "the sign of unfolding, in accordion shape, of the mucous membrane" (Fig. 2, 4 and 6). There is therefore also in this line a fundamental contradiction between the two methods of opacification, being another important character-

istic of roentgenological examination of epiplopericolitis.

Sometimes, with the oral method, the folding defect is not visible (Fig. 3), while the opaque enema, in the same cases reveals the alteration (Fig. 4).

(5) *Extension of the process.* It has been said (Weber) that epiplopericolitis extends to a larger segment than in the malignant neoformations of the colon. We do not agree with this opinion, for although in our Case I the alteration extends to the ascending colon and right transverse hemicolon, in Cases II and III (Fig. 4, 5 and 6) it has only a small extension, especially in Case II. In one of Rückensteiner's cases, the one caused by the fish bone, as in our Case II, the extension was only three fingers breadth; in the other, of the same author, situated at the level of the segment nearest to the splenic colon there is an extension of only 3 cm.

Discrepancy between the extension of roentgenological image and that of the palpable tumor:

The presence of a stenosis, as it appears at the roentgen examination, at the colon level and coinciding with an extensive palpable tumor, frequently and mistakenly leads one to accept it as a malignant neo plastic process, which makes the surgeon consider a radical surgical operation, as happened in one of the cases mentioned by Rückensteiner. This is because the epiploic reaction spreads by adherence and adematous infiltration very much farther than that which appears in the stenosis as seen roentgenographically. The granuloma, therefore, does not remain within the limits of the original focus. Thus, there is a difference between the palpable finding and the extension of the roentgenological image.

This discrepancy must be taken in favor of a benign process.

It is therefore necessary to point out the fundamental importance of the examination by means of the opaque enema, as this method is sufficient by itself to make a diagnosis of epiplopericolitis. The oral opacification is likely to lead to an erroneous diagnosis, by taking the process for a neoplastic one, as could have happened in Cases I and III; or it may not reveal any alteration whatever, as in Case II.

It is only the pharmacodynamic test that permits this differentiation between the benign and the malignant process. It is the stimulus which is provoked by the intramuscular injection of 1 cc. of pitressin. This hormone of the posterior lobule of the hypophysis determines, in a few minutes, a frank activity of the muscularis mucosae; the peristalsis of the colon is quite visible during roentgenoscopic examination.

When the neoplasia has affected the ascending or transverse cecal section of the colon, it is noted that the peristalsis is stopped next to the tumor, where the mucous membrane folds disappear and the stenosis persists.

In an epiploitis, the peristalsis is normal in the stenosed section and the mucous membrane folds are distinctly visible, with the same characteristics as in the neighboring normal sections.

SUMMARY

The fundamental roentgenologic signs of epiplopericolitis are: In the oral method of examination, a stenosis with apparent destruction of the mucous membrane of the colon, while the opaque enema or pharmacodynamic test reveals an image of a preserved funnel or two cones opposed by their vertexes, gradual transition of the stenosis toward the normal sections and a discrepancy between the extension of the roentgenologic image and that of the palpable tumor.

CONCLUSION

(1) We believe that the diagnosis of epiplopericolitis would be much more frequent if all the cases which have undergone surgical intervention were submitted to a routine roentgenological examination and which in the postoperative condition showed doubtful clinical symptoms.

(2) The roentgenological image of epiplopericolitis is, in itself, typical enough to make certain the correct diagnosis. It is the only means of examination capable of revealing proper characteristic signs which are difficult to be mistaken for any other process of the intestine.

(3) In observing roentgenological signs it is of the utmost importance to make certain that the mucous membrane of the colon is intact in a stenosed segment.

(4) The pitressin pharmacodynamic test is of fundamental importance in differentiating the benign from the malignant lesions.

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SPONTANEOUS PNEUMOUROGRAPHY FOLLOWING URETEROSIGMOID TRANSPLANTATION

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SUCCESSFUL transplantation of the ureters into the bowel has been the goal of surgeons for the past several decades. In conditions where it is necessary to divert the urinary stream, it is desirous to obtain a result that allows the patient to retain some control over the evacuation of urine. Nephrostomy tubes, cutaneous ureterostomy and suprapubic drainage as permanent exits for the urinary stream are painful, embarrassing maladies for the patient to endure. Attempts to find a suitable body cavity to retain the urine so that it may be intermittently expelled have not been entirely successful. The lower colon is the only adaptable cavity that has been found to date to serve this purpose. The appendix, the cecum, an isolated loop of bowel with a skin fistula, the rectum closed above with diversion of the fecal stream through a colostomy, have all been tried on humans, but use of the intact pelvic colon is the most practical and produces better results with no higher mortality from ascending infection and less operative risk. The container chosen must not be an absorptive structure, as is the small intestine, or the patient will absorb his nitrogenous waste products soon after excretion. The distal colon would seem ideal, for here we have a structure that absorbs little of the chemical constituents of urine, and evacuation may be controlled voluntarily by the anal sphincter. This situation appears analogous to the cloaca of lower animals where both the fecal and urinary streams pass through a common cavity and are evacuated through a common orifice. The embryological and apparent similarity of the distal colon and the cloaca would cause one to conclude that the colon is ideally adapted to serve as a cloaca. However, this is not borne out in clinical or experimental work, for when the urinary tract of man is transplanted into the distal colon, an ascending pyelonephritis invariably follows and there is disturbance of the acid-base balance with a tendency to acidosis due to absorption of electrolites from the colon.

The first implantation of the ureters into the colon was performed by Smith, an English surgeon, in 1878 who transplanted one ureter and then eleven months later transplanted the other ureter. Shortly after the second operation the patient died and autopsy showed the first kidney had been completely destroyed by infection. Since then several surgeons have attempted the procedure, but it was not until Coffey in 1911 offered his techniques of performing the operation that the procedure began to be accepted by the surgical world. He advocated the necessity for using the pelvic colon as the site for implantation, and his technique of anastomosis was directed toward establishing a valve-like mechanism out of the colonic mucosa that would prevent the reflux of feces into the ureter. Since Coffey's original contribution, several have devised variations in the technique of anastomosis, but all have agreed that the pelvic colon is best suited as the site of anastomosis. Despite the experimental research and multitude of technical advances, no one has found a means to avoid the ascending infection that follows the anastomosis. Because of the fear of infection, the operation did not gain widespread acceptance until the present-day era of sulfonamides and antibiotics. These "wonder drugs" afford a means of performing the operation without fear of mortality from peritonitis due to leakage at the operative site and offer a weapon to combat the pyelonephritis that follows the opera-

tion and although the ascending infection may not be eradicated in the majority, its progress is materially retarded. The tenddency to acidosis is fairly well controlled by daily oral ingestion of alkaline salts.

Although today there are about sixty-five variations of the technique by which the operation may be performed, all may be classified for our purpose under one of three broad groups with respect to the type of anastomosis employed. The first group (see Fig. 1) is the original Coffey type operation, known as the "Coffey I operation." Here the ureter is passed obliquely through the muscularis of the colon to the submucosa where the ureter tunnels for a distance of 1 to several centimeters through the submucosa before penetrating through the colon mucosa into the lumen of the bowel. The theory behind such a technique is that the bowel mucosa will act as a valve occluding the ureteral opening by compressing the tunneled ureter whenever the intraluminal pressure of the colon is increased by flatus or feces, and hence prevent the regurgitation of feces or flatus into the ureters. Originally it was thought that, since during the immediate postoperative period the transplanted ureter may be occluded by surgical edema, it was considered safe to transplant only one ureter at a time by this method. To avoid the necessity of a second operation, Coffey later introduced a variation of his first operation in which he transplanted

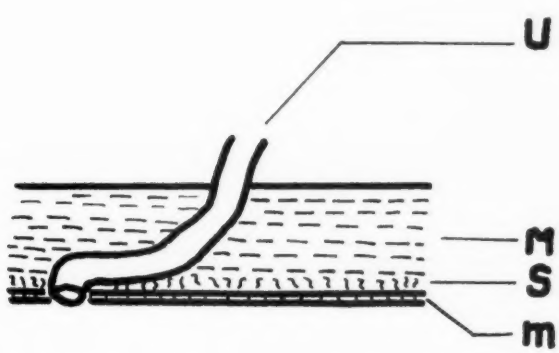

Fig. 1. Group I type operation. In this type operation the ureter (*U*) tunnels through the submucosa (*S*) before penetrating the mucosa (*M*).

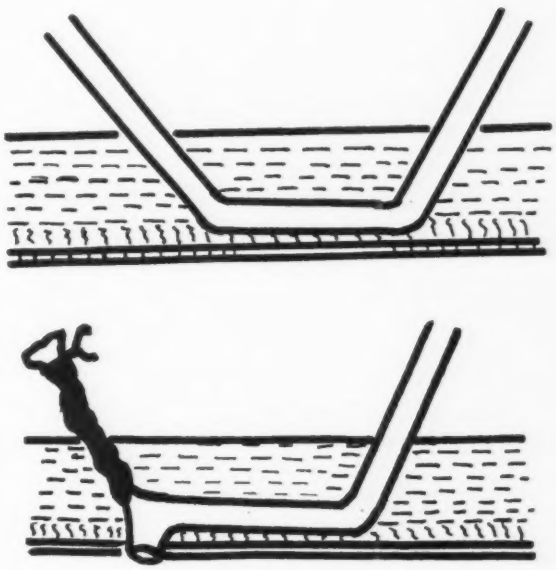

Fig. 2. Group II type operation is performed in two stages. The first stage (upper drawing) consists of implanting the intact ureter in a submucosal trough. The second stage (lower drawing), performed after several weeks, consists of severing and tying the distal limb of the ureter.

both ureters at the same time but had ureteral catheters placed into both transplanted ureters at the time of operation with the distal ends of the catheters extending out of the anus, thus avoiding obstruction from edema. This variation is known as the "Coffey II technique." Coffey also introduced a third operation which is similar to his other two except the mucosa of the bowel is not opened at the time of operation. The severed ureter is placed in the submucosal bed with a tight nonabsorbable transfixation suture through the lumen of the ureter and bowel. This suture sloughs in a few days because of pressure necrosis and the uretero-intestinal fistula is established. It has the obvious disadvantage that only one side can be done at a time since the kidney cannot excrete until the fistula is established. Several surgeons have experienced failure of the transfixation suture to cause complete sloughing and consequently no anastomosis was established.

The second group of operative techniques (see Fig. 2) consists of implanting

the unsevered ureter into the wall of the colon. This group is a two stage operation requiring opening the abdomen on two different occasions. The first stage consists of laying the intact ureter into a trough 3 to 5 cm. long which is made by incising the wall of the colon down to the submucosa. The muscularis and serosa of the colon are sutured over the intact ureter.

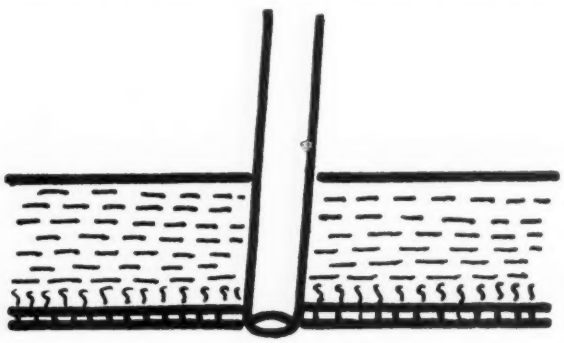

Fig. 3. Group III type operation. The end-to-side anastomosis.

The second operation follows after a period of no less than two weeks, and at this time the distal limb of the implanted ureter is severed and tied off and the cystectomy is usually done at this time. The techniques of this group are further subdivided into modifications, depending on when and how the anastomosis between the ureter and bowel lumen is accomplished. One modification (Higgins) places a transfixation suture through the ureter and bowel mucosa at the time of the first operation so that by pressure necrosis the anastomosis develops, and then at the second operation the distal ureter is cut and ligated. Another modification of this second group is the Jewett operation, where the anastomosis is completed at the time of the second operation when a specially devised electrode is passed through the lumen of the severed distal limb of the tunnel and an opening is burned by cautery through the ureter and colonic mucosa.

The third group of operative techniques (see Fig. 3) is the simple end-to-side anastomosis and this group has various modifications depending on how the ureter is sutured to the bowel wall. The end result in all end-to-side anastomoses is probably the same. The Nesbit and Cordonnier modifications are examples of this group.

The operations of the second group, requiring two operations, are not in vogue at the present time. Methods employing the transfixation suture to establish the fistula have been rejected as unreliable. Perhaps the most frequently used methods today are modifications of the Coffey I and II, and the Nesbit and Cordonnier modifications of the end-to-side anastomosis. By any of the latter operations both ureters may be transplanted and the cystectomy performed at one operation.

The chief indications for transplantation of the ureter are carcinoma of the bladder, either primary or secondary invasion from the prostate or cervix, where cystectomy is contemplated; vesicovaginal fistula that cannot be repaired by more conservative surgery; extrophy of the bladder; intractable vesical tuberculosis; or, extensive traumatic injury to the bladder or proximal urethra. It is usually better to do cutaneous ureterostomy than to do ureterosigmoid anastomosis in the presence of an incompetent anal sphincter, for under such circumstances the patient is then constantly soiled with feces and urine and excoriation of the skin of the buttocks ensues. In patients with normal anal sphincters, voluntary urinary control is usually easily achieved and the evacuations usually number about four to eight per day.

It has long been argued whether the group one and two type operations, where an attempt is made to form some sort of valvular mechanism, are really effective in the prevention of ascending infection. Hinman and Weyrauch in their excellent collective review[2] of uretero-intestinal transplants conclude that no such action is achieved and also that intestinal reflux is as likely to occur whether a muscular canal is made or not. It is doubtful that such operations do in any way influence the occurrence of infection in the upper urinary tracts. This study, however, seems

TABLE I

CASES OF URETEROSIGMOID TRANSPLANTATION

Case No.	Sex and Age	Date of Operation	Side of Operation	Type of Anastomosis	Site of Operation	Cause for Operation	Pneumourogram after Operation
1	M 58	4/16/47	Bilateral	Coffey I	Sigmoid	Bladder carcinoma	No
2	M 70	7/ 6/47	Left	Coffey II	Sigmoid	Bladder carcinoma	No
3	M 56	7/23/47	Right	Coffey II	Sigmoid	Bladder carcinoma	No
4	M 37	8/ 4/47	Bilateral	Coffey I	Sigmoid	Bladdre carcinoma	No
5	M 75	8/ 6/47	Right	Coffey I	Sigmoid	Bladder carcinoma	No
6	M 60	10/31/47	Bilateral	Coffey I	Sigmoid	Bladder carcinoma	No
7	M 62	11/ 7/47	Bilateral	Coffey I	Sigmoid	Traumatic urethral stricture	No
8	M 41	1/ 2/48	Bilateral	Coffey I	Sigmoid	Extrophy	
9	M 69	3/ 1/48	Bilateral	Coffey I	Sigmoid	Bladder carcinoma	No
10	M 56	4/21/48	Left	Coffey I	Descending colon	Bladder carcinoma	No
11	M 60	4/23/48	Bilateral	Coffey I	Sigmoid	Bladder carcinoma	No
12	M 15	5/26/48	Bilateral	Coffey I	Sigmoid	Extrophy	No
13	M 1	6/14/48	Bilateral	Coffey I	Sigmoid	Extrophy	No
14	M 59	7/ 9/48	Bilateral	Coffey II	Sigmoid	Bladder carcinoma	No
15	M 73	7/16/48	Right	Coffey II	Sigmoid	Bladder carcinoma	No
16	M 64	7/19/48	Left Right	Coffey I Coffey II	Sigmoid	Bladder carcinoma	No
17	M 52	8/27/48	Bilateral	Coffey I	Sigmoid	Bladder carcinoma	No
18	M 1	9/28/48	Right Left	Coffey II Nesbit	Sigmoid	Extrophy	No
19	M 57	10/15/48	Left	Nesbit	Rectum	Bladder carcinoma	No
20	M 43	10/25/48	Bilateral	Coffey I	Sigmoid	Bladder carcinoma	No
21	M 1	11/17/48	Bilateral	Coffey I	Sigmoid	Extrophy	No
22	M ½	2/ 8/49	Bilateral	Coffey II	Sigmoid	Extrophy	No
23	M 66	2/28/49	Bilateral	Coffey II	Sigmoid	Bladder carcinoma	No
24	M 37	4/11/48	Bilateral	Coffey II	Sigmoid	Bladder carcinoma	No
25	M 41	4/14/49	Bilateral	Nesbit	Recto-sigmoid	Bladder carcinoma	No
26	M 49	4/22/49	Bilateral	Coffey I	Recto-sigmoid	Bladder carcinoma	No
27	M 55	5/22/49	Bilateral	Nesbit	Sigmoid	Bladder carcinoma	Yes, on left 10 days postoperative
28	M 84	5/25/49	Right	Coffey I	Sigmoid	Bladder carcinoma	No
29	F 38	8/15/49	Right Left	Coffey II Nesbit	Sigmoid	Carcinoma of the cervix, grade 4	Yes, on left side 2 mo. postoperative
30	M 57	9/ 7/49	Bilateral	Cordonnier	Sigmoid	Bladder carcinoma	Yes, bilateral 3 wk. postoperative
31	M 57	10/17/49	Right	Cordonnier	Sigmoid	Bladder carcinoma	Yes, right side 1 wk. postoperative
32	M 43	10/26/49	Bilateral	Nesbit	Recto-sigmoid	Bladder carcinoma	Yes, bilateral 12 days postoperative
33	M 76	11/14/49	Bilateral	Nesbit	Recto-sigmoid	Bladder carcinoma	Yes, right side 19 days postoperative

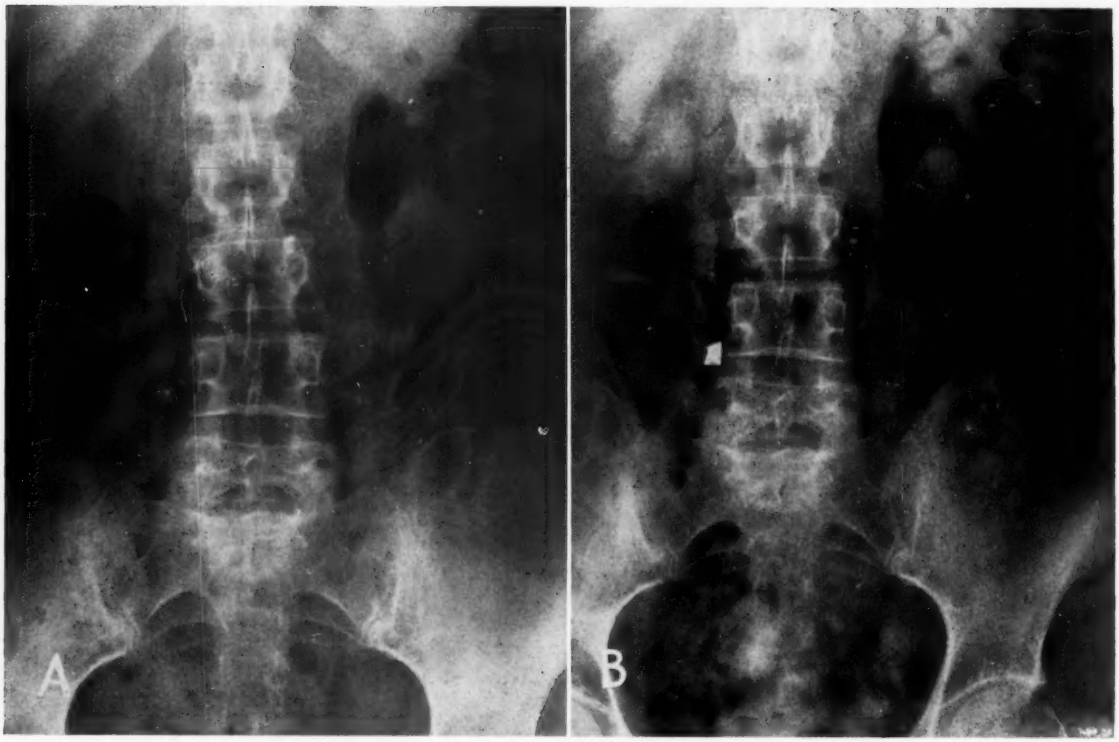

Fig. 4. Case 29. (*A*) Plain film made two months after bilateral ureterosigmoid transplant (Coffey II type on right and end-to-side on left) shows left ureter and pelvis outlined by gas, but no gas is seen on the right side. (*B*) Twenty minutes after intravenous injection of Neo-iopax opaque material is seen in good concentration in right pelvis, ureter and sigmoid colon, but gas remains on left with no evidence of function.

to support the contention that feces and flatus are much less likely to regurgitate when a muscular canal type anastomosis is employed than in a simple end-to-side anastomosis.

During the past two years 33 cases of ureterosigmoid transplantation were done at the Johns Hopkins Hospital. These cases and their postoperative urograms were reviewed and salient features of each case are set forth in Table 1. Special atten-

Fig. 5. Case 27. This patient has had several films made postoperatively, all of which show bubbles of gas either in the ureters or pelves. Stereoscopic views demonstrate the gas to be in the urinary tract. This illustration shows the appearance of a single bubble in the left ureter ten days after operation. There is intravenous neo-iopax outlining the pelvis and ureter and the bubble is seen about 3 cm. below the ureteropelvic junction. Other films show gas in the right ureter and in both pelves but these are not satisfactory for reproduction.

tion was directed toward detecting the presence of gas in the ureters or the renal pelves in the intravenous urograms made after the ureteral transplantation. Scrutinization of these films failed to reveal any gas in 27 of the cases done during the past two years, but in the last 6 cases operated upon gas was detected in the upper urinary tracts. The study was limited to only the last two years because prior to 1947 the films are no longer available.

The roentgenographic demonstration of gas in the upper tracts seems to be a fortuitous finding because in 5 of the 6 cases the gas is demonstrated on only one or two of the films of one intravenous urographic series, and no gas at all can be found on several films made at a later date. The gas is seen to be replaced by the excreted opaque urine in several of the films, demonstrating that the gas is present only when the ureter or pelvis does not contain urine. This suggests that probably two factors operate to cause the pneumopyelogram: (1) The kidneys are in a state of relative oliguria caused by the dehydration ordinarily insti-

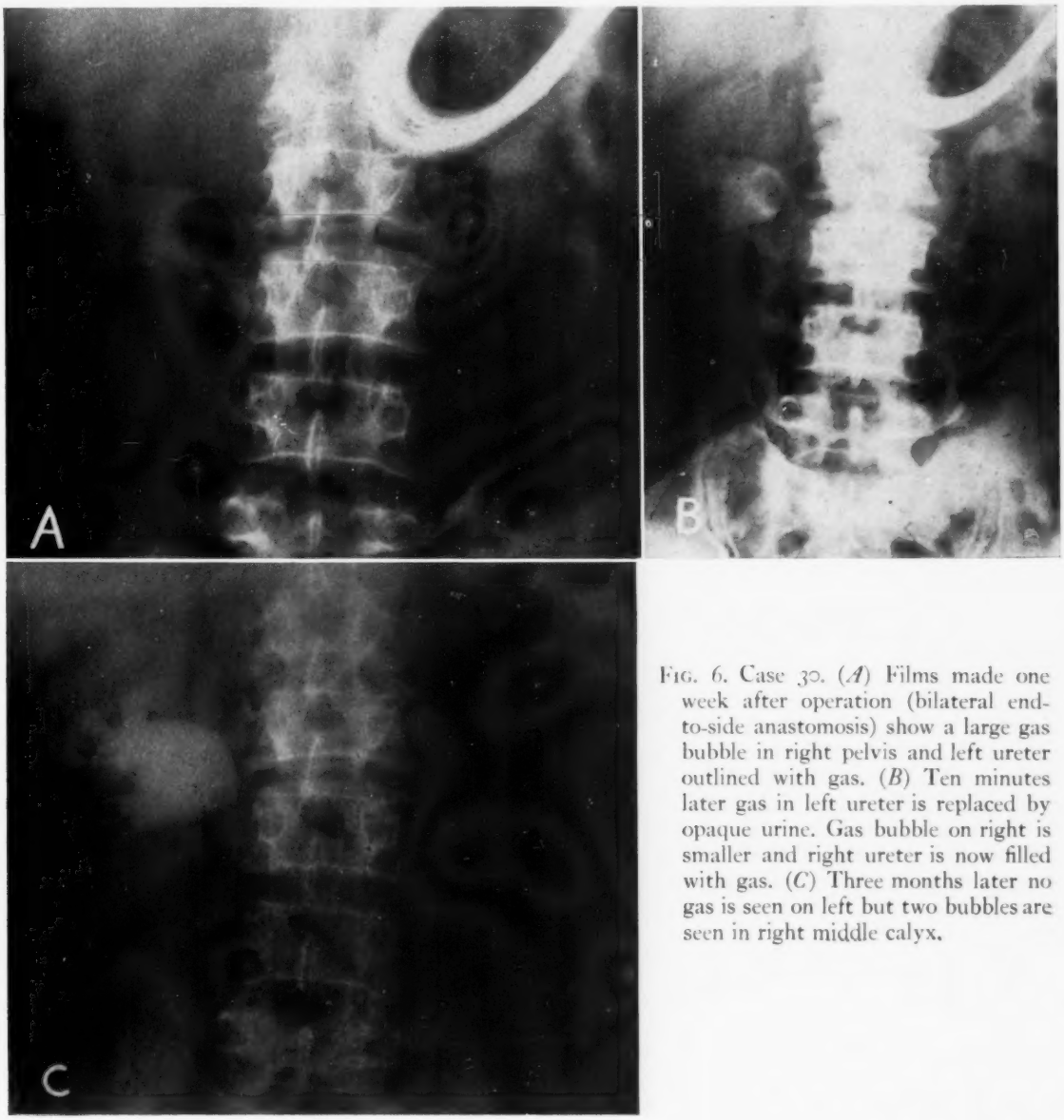

Fig. 6. Case 30. (*A*) Films made one week after operation (bilateral end-to-side anastomosis) show a large gas bubble in right pelvis and left ureter outlined with gas. (*B*) Ten minutes later gas in left ureter is replaced by opaque urine. Gas bubble on right is smaller and right ureter is now filled with gas. (*C*) Three months later no gas is seen on left but two bubbles are seen in right middle calyx.

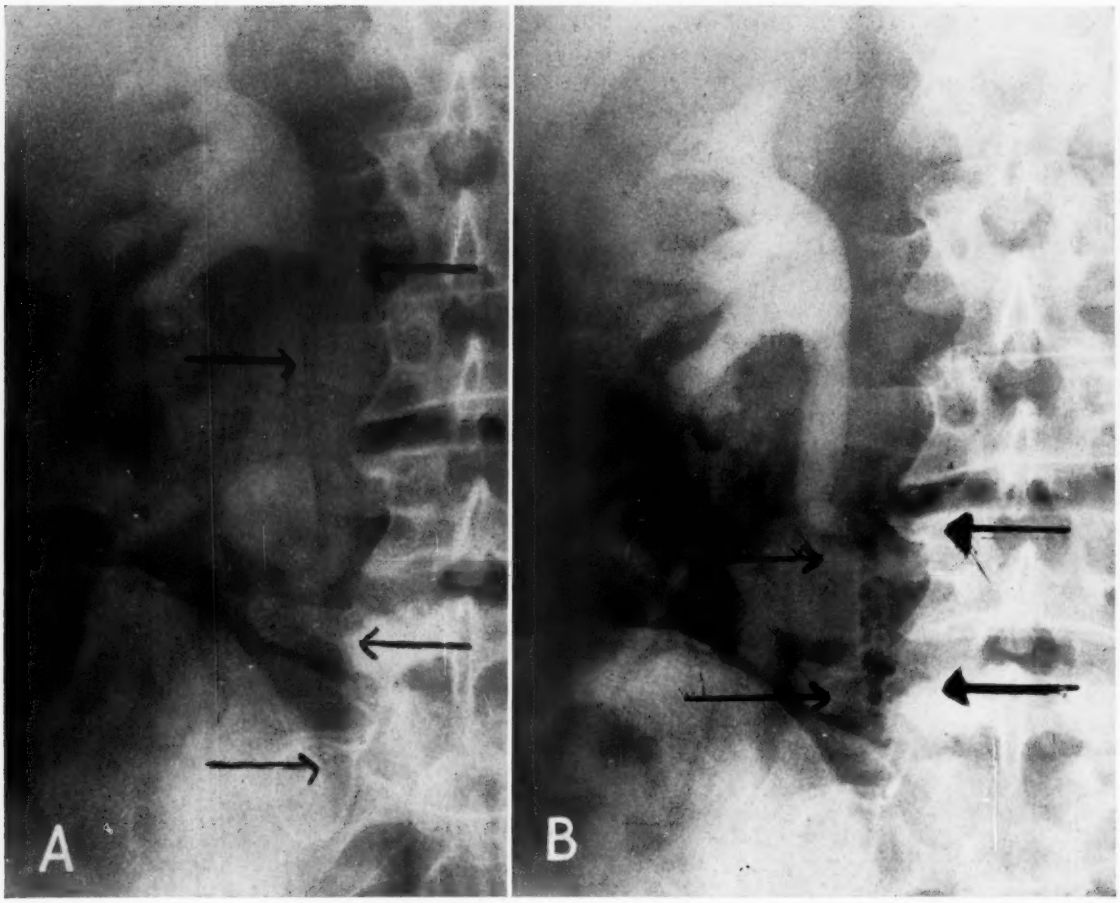

Fig. 7. Case 31. (*A*) Right side only operated upon (end-to-side anastomosis) because left side was nonfunctioning. Film made ten minutes after injection of dye shows right ureter outlined with gas. (*B*) Twenty minutes after injection of dye, most of gas has been expelled from right ureter but several bubbles remain in distal portion.

tuted in preparation for the intravenous urogram, and the ureters and pelves do not remain filled with urine. In the normal upper tract the ureter and pelvis cannot empty completely at any time; instead the urine in the pelvis is replaced by newly excreted urine. Complete emptying in the normal is impossible because there is nothing to replace the urine, and a vacuum would result following complete emptying unless the pelvis could collapse completely. The intestinal transplanted ureters and pelvis may, however, evacuate all their urine by replacement of the urine with intestinal gas. (2) The second factor operating is that intestinal gas be available at the site of anastomosis and that it can communicate freely with the ureter. It is doubtful that the pressure of the gas is an important factor in determining whether reflux of gas will occur.

Spontaneous pneumopyelography, as reported, is exceedingly rare. Alexander[1] reviewed the literature in 1941 and found only 6 examples of either the ureter or renal pelvis showing spontaneous pneumograms, and he reported a case of his own. None of these cases was a ureterosigmoid transplant. All were diabetics with pneumopyonephrosis where the gas was generated by the infecting organisms. No report of pneumopyelography after ureterosigmoid transplant could be found in the literature.

The finding of gas in the ureters and pelves demonstrates dramatically that in some cases of ureterosigmoid transplanta-

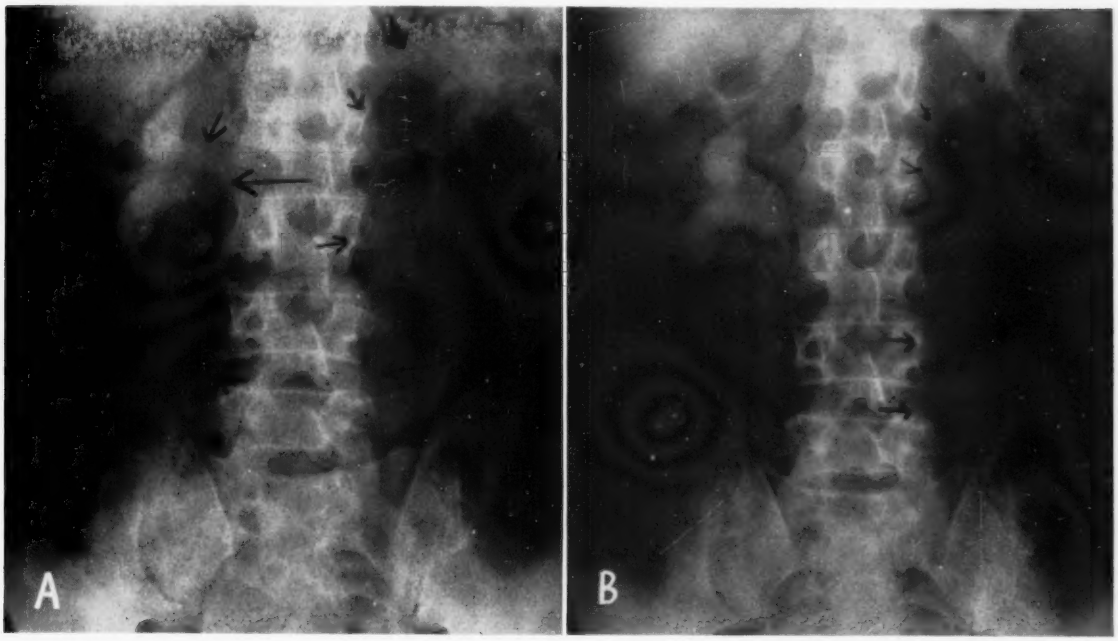

Fig. 8. Case 32. (*A*) Ten days after operation gas outlining both pelves and ureters is shown in the ten minute film. (*B*) Twenty minute film shows left pelvis and ureter still filled with gas, but right pelvis is now filled with opaque urine. No function is seen on left side.

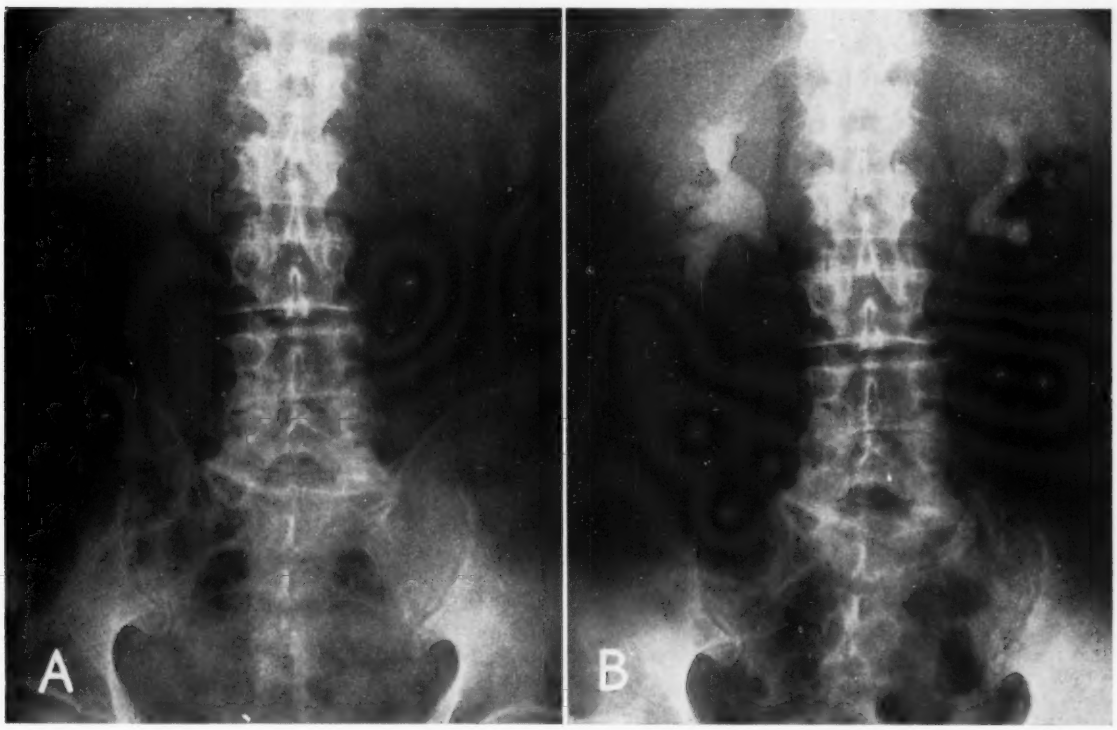

Fig. 9. Case 33. (*A*) Bilateral end-to-side anastomosis performed. Only one urogram made after operation and this showed no gas on left side but right ureter was clearly defined on plain film. (*B*) Twenty minutes after dye injection, both sides well visualized with no evidence of gas. The gas in the right ureter is now completely replaced by opaque urine.

tion the upper tracts are grossly contaminated with bacterial laden flatus. None of the 33 patients of this series had diabetes and it is very doubtful that ascending bacteria could generate the gas seen in the 6 cases demonstrating gas. The preoperative urinary cultures in both groups were not remarkable and contained only coli aerogenes or were sterile in all but 1 case (Case 10) which showed a few colonies of a nonhemolytic streptococcus with coli aerogenes Of the patients that had postoperative blood cultures, none showed pathogens. The site of the implantation was studied as a possible explanation for the gaseous reflux, but this proved to offer no explanation. All cases were transplanted into the sigmoid or rectosigmoid area, except in 1 case (Case 20) in which the site was the rectum and in another (Case 10) the descending colon. Neither of these cases showed gas. The only apparent correlation that can be made between the cases showing gas and those not showing gas is the type of anastomoses employed. This small study indicates that only after the end-to-side type of anastomosis is flatus recognized in the ureters or pelves. In 1 case (Case 29) the end-to-side anastomosis was performed on the left side and a Coffey II operation was performed on the right side. The left side shows gas, but not the right side. Not all of the cases having end-to-side anastomosis showed gas. Three cases (Cases 18, 19 and 25) had end-to-side anastomosis and no gas could be found on any of the postoperative films taken on these patients.

These observations appear to indicate that flatus contamination of the urinary tract is more likely to follow an end-to-side anastomosis than the other types of ureterosigmoid transplantation.

It is not the intention of this paper to convey the opinion that the end-to-side anastomosis is inferior to the other types of ureteral implantation; nor should the visualization of gas in the upper urinary tracts cause one to condemn the operation. Clinical observations and studies on the patients showing reflux of gas have not differed from the group not showing gas. There are many other factors that cause the urological surgeon to favor end-to-side anastomosis. Autopsy studies have shown that with Type I and II anastomosis the ureteral meatus becomes very small, often decreasing to the size of a pin point, and that the upper tracts develop increasing hydronephrosis with diminishing renal function, which may necessitate cutaneous ureterostomy or reimplantation of the ureter into the bowel to establish an adequate urinary flow. It is believed that the end-to-side anastomosis maintains an adequate meatus.

The purpose of this paper is simply to call to the attention of radiologists that gas may be observed in the ureters and renal pelves in films made of the abdomen of some patients who have had ureterosigmoid transplantation. Since the operation is not infrequent today, it is likely that refluxed gas in the urinary tracts will not be an exceedingly rare roentgenological observation if it is looked for in patients giving a history of the operation. For the present at least, no prognostic significance can be attached to this reflux of intestinal gas and it should be regarded as an inconsequential roentgenological demonstration.

SUMMARY

Following ureterosigmoid transplantation, intestinal gas may be visualized in the ureters and pelves. Six cases of a series of thirty-three ureterosigmoid transplantations showed gas. All of the cases showing gas had an end-to-side type of anastomosis.

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Vol. 66, No. 2

SPONTANEOUS PNEUMOCEPHALUS*

REPORT OF A CASE OCCURRING IN THE COURSE OF CARCINOMA OF THE NASOPHARYNX

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SPONTANEOUS or non-traumatic pneumocephalus is the occurrence of an uninduced abnormal collection of air within the cranial cavity. In our patient the pneumocephalus occurred in the course of carcinoma of the nasopharynx. Because of the interesting clinical and roentgenographic findings and because no similar incident can be found in the literature the case is reported.

Spontaneous pneumocephalus was first described by Chiari in 1884 in a patient with purulent ethmoiditis. Since then approximately 30 cases have been reported. Of these, 9 occurred secondary to an infectious process and the others were secondary to tumor. The majority of those secondary to tumor occurred as a result of erosion by fronto-ethmoid osteomas. Cushing reported 4 such cases in 1927. In 1939 Kessel collected 15 cases to which he added a sixteenth. Only 2 reports concern tumors other than fronto-ethmoid osteoma. In 1928 Bertolotti reported the death of a patient with pneumoventricles secondary to gliomatosis. Hill, in 1942, reported pneumocephalus secondary to a nasopharyngeal fibroma in a boy of thirteen. His patient, like ours, survived without ill effects.

Pneumocephalus may be classified according to anatomical location.

I. Extracranial
II. Intracranial
  A. Extradural
  B. Subdural
    1. Extraventricular
      a. Cortical
      b. Cisternal
    2. Ventricular

Spontaneous pneumocephalus should be distinguished from traumatic pneumocephalus. The latter is more frequent and is usually seen in association with fracture, particularly in cases where the fracture enters the paranasal sinuses. Over 100 cases of this type have been reported. Many excellent papers are available on the subject.

The differential diagnosis of pneumocephalus is not difficult. Some conditions which might simulate pneumocephalus are normal radiolucent areas of the skull, porencephaly, intracranial lipoma, defects in skull or scalp and artefacts.

Symptoms and signs vary. Two which are most characteristic are cerebrospinal rhinorrhea and headache which becomes more severe following sneezing or blowing the nose. Since the collection of air has all the characteristics of a space-occupying mass, the symptoms may parallel those of brain tumor and may include nausea, vomiting, dizziness, impaired sensorium, paralysis, convulsions, and papilledema.

Our case is unusual in several respects. The spontaneous pneumocephalus occurred in the course of carcinoma of the nasopharynx by way of extension through the base of the skull into the right lateral ventricle. There was no rhinorrhea. The opening closed spontaneously. Symptoms lasted only one week. There has been no recurrence or secondary effect during the interval of fourteen months since the occurrence.

CASE REPORT

C. P. R., a male, aged thirty-eight, was admitted to the Veterans Administration Hospital

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Fig. 1. Initial study showing destruction of the base of the skull on the right involving the sphenoid bone and petrous portion of the temporal bone. Note sequestrum anteriorly.

in New Orleans on October 1, 1949, with the diagnosis of neoplasm of the nasopharynx with metastases to the cervical lymph nodes. His complaints dated back to 1945 when, following a jeep accident, he developed pain, stiffness, and swelling in the right side of the neck. He subsequently developed relatively severe headaches.

In October, 1946, he consulted his local physician who did a lymph node biopsy from the right side of the neck. This was reported as benign. The patient was given a course of radiation therapy of 1,020 r through a 3 by 5 cm. portal to the right side of the neck in five treatments using the following factors: 200 kv., 1 mm. Cu plus 1 mm. Al filter, 5 ma., 50 cm. distance.

He was seen at another clinic and between December 2, 1946, and January 31, 1947, he received an additional 2,400 r through a 4 by 6 cm. portal to the right side of the neck with the following factors: 200 kv., 0.5 mm. Cu. plus 1.0 mm. Al filter, 25 ma. 50 cm. distance. There was relief of symptoms and decrease in the size of the masses in the right cervical area.

In December, 1947, severe exacerbation of symptoms, including headache, occurred. In addition to former symptoms, there was severe nasal obstruction and discharge. The mass in the right cervical area increased in size. At this time biopsy of a cervical lymph node was reported squamous carcinoma, Grade 3. A subsequent examination of the nasopharynx revealed a large tumor mass behind and bordering on the posterior margin of the right eustachian tube. Biopsy of this mass revealed carcinoma of similar histopathology to that from the previously examined metastatic node.

Radiation therapy was continued. Ten radon seeds each containing 1.5 mc. of radon were inserted into the primary tumor in the nasopharynx. Following this, between December 4 and December 18, 1947, he received 2,000 r in ten treatments through a 3 by 5 cm. portal to the right nasopharyngeal area using the following factors: 400 kv., composite filter equivalent to 5 mm. Cu., 5 ma., 70 cm. distance. Between January 12 and January 17, 1948, an additional 1,000 r was administered through the same portal using the same factors. The patient was seen at the same clinic on July 21, 1948, and a dose of 2,000 r was given through a 10 by 10 cm. portal to the left side of the neck using the same factors. An additional 1,600 r was subsequently administered to the original field on the right in August, 1948.

Physical examination on admission revealed a firm mass of matted lymph nodes in the right side of the neck extending from the angle of the jaw to the clavicle. There also was a mass of indurated lymph nodes in the right submaxillary area. The larger mass measured approximately 8 by 10 cm. The skin of the neck and face was in remarkably good condition considering the amount of therapy which had been administered. Except for some alopecia there were no significant changes. Examination of the nasal cavity revealed some piled-up mucous membrane in the floor of the right nostril extending from the septum to the lateral nasal fossa.

The patient had remarkably few symptoms, his pain was controlled by aspirin. During the patient's initial stay at this hospital the lesion in the floor of the nasopharynx was biopsied and revealed the presence of a squamous papilloma. This apparently was a completely independent lesion from the original primary lesion in the region of the right eustachian tube.

On October 8, 1948, roentgenographic examination of the skull (Fig. 1) showed an ero-

Fig. 2. Lateral view of the skull showing cortical pneumocephalus with pocket of air in the temporal area.

sive and destructive lesion measuring 2.7 by 3.5 cm. in the right side of the base of the skull involving the sphenoid and temporal bones with dissolution of the basal foramina and the petrous tip. A sclerotic fragment having the appearance of pterygoid plate lay within the defect. Moderate opacity of the sphenoid and ethmoid cells on the right was noted. There also was present at this examination an "s"-shaped radiolucent zone extending upward in the right temporal area measuring approximately 2.5 by

Fig. 4. Ventricular pneumocephalus on October 18, 1948, showing filling of the anterior horn of the right lateral ventricle and a small amount of air in the third ventricle.

Fig. 3. Posteroanterior view at the same time as Figure 2.

1.0 cm. which had the appearance of a pocket of air (Fig. 2 and 3).

On October 18, 1948, the patient developed sudden severe headache following a rather forceful blowing of his nose. No nasal discharge was noted. Roentgenographic examination at this time revealed the presence of air in the right lateral ventricle and a small amount of air in the third ventricle (Fig. 4 and 5).

The patient's symptoms gradually subsided and by October 25 he was symptom free. At this time only a small triangular radiolucent zone was seen in the region of the original col-

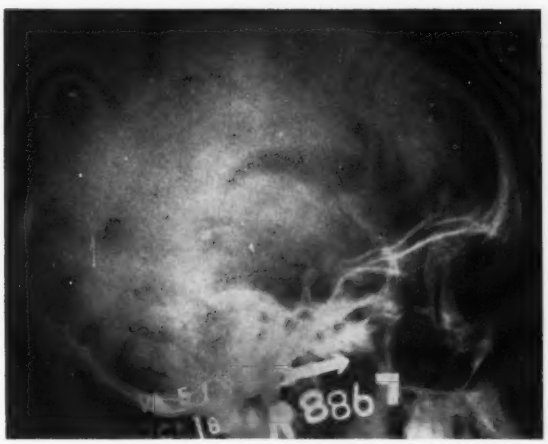

Fig. 5. Lateral view corresponding to Figure 4.

Fig. 6. Planar roentgenogram showing the defect in the right sphenoid bone through which the air had entered the cranium.

lection of air. By November 1, 1948, there was no evidence of air.

The remainder of the patient's course in the hospital was uneventful. He was operated upon on December 1, 1948, with cauterization of the papillomatous growth in the floor of the nasal fossa. A careful examination at this time showed a necrotic area in the region of the right eustachian tube. He was discharged on December 8, 1948, with instructions to return in February.

This patient was readmitted on February 13, 1949. During the interval he had continued to have pain in the right side of the neck and in the jaw. There had been no recurrence of headaches. Roentgenographic examination at this time including planar roentgenographic studies illustrated well the previously described zone of erosion in the base of skull (Fig. 6). It appeared to have increased since previous examination. A definite sclerotic sequestrum was again noted in its anterior aspect. The patient was discharged with instructions to return in three months.

The next admission was on April 22, 1949. His complaints were similar to those on the previous examination. However, there had been a 5 pound weight loss since the previous admission and an increase in pain with difficulty in chewing food. He also had noted an increase in the size of the mass, particularly in the right submandibular area.

On April 23, 1949, a piece of bone was extruded spontaneously from the nasopharynx which measured 2 by 11cm. which had the appearance of pterygoid plate of the sphenoid bone. Subsequent roentgenographic examination showed the previously described sequestrum to be absent (Fig. 7). A nerve block was done to the third branch of the 5th nerve with 95 per cent alcohol with relief of symptoms.

This man has been followed by our tumor board at intervals of two months. There has been some increase in the amount of edema in his submandibular area. Movement of his jaw is somewhat more limited and his pain has increased. However, it is still controlled by aspirin. At his last observation on October 30, 1949, a few small, hard lymph nodes of more discrete nature were noted in the supraclavicular area. These felt neoplastic. The patient was discharged to return in two months.

Fig. 7. Basal view April 24, 1949, showing previous defect enlarged and sequestrum absent.

DISCUSSION

This patient evidenced two different types of pneumocephalus in the course of his episode. On October 4, 1948 (Fig. 2 and 3), the collection of air was cortical. On October 18, 1948 (Fig. 4 and 5), it was ventricular.

It is difficult to evaluate what part necrosis as well as neoplasm played in the development of pneumocephalus in our patient. If the dose of radon is added to the tumor dose of roentgen radiation the primary site must have received well over 10,000 r.

It is remarkable that more cases of spontaneous pneumocephalus secondary to carcinoma and lymphoepithelioma of the nasopharynx do not occur. A high percentage of these lesions show extension into the base of skull and into the cranium as evidenced by bone destruction and cranial nerve involvement. It appears that in most cases there is sufficient tumor mass and reactive fibrosis to prevent its occurrence.

CONCLUSION

An unusual case of spontaneous pneumocephalus occurring in the course of carcinoma of the nasopharynx has been described. Though the carcinoma was not cured, the patient recovered from the pneumocephalus without untoward effect. He is still alive and little changed fourteen months later.

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ESOPHAGOBRONCHIAL FISTULA THROUGH AN ESOPHAGEAL DIVERTICULUM*

REPORT OF A CASE WITH TREATMENT BY CAUTERIZATION

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THE following case report is presented because of the infrequent occurrence of an esophagobronchial fistula through an esophageal diverticulum and also to report the successful treatment of this case by the sodium hydroxide cauterization method of Clerf, Cooley and O'Keefe.[3]

INCIDENCE OF ESOPHAGOTRACHEOBRONCHIAL FISTULA

In spite of the intimate anatomical relationship between the esophagus and the tracheobronchial tree, fistulous tracts between the two structures are not as common as might be expected. Monserrat[6] reviewed the world literature in 1941 and found 670 reported cases of esophagotracheobronchial fistula, of which 222 were congenital, 367 neoplastic, 41 infectious, and 40 traumatic in origin. Moersch and Tinney[5] reported 39 cases, of which 18 were associated with malignancy, 5 secondary to trauma, 9 infectious in origin (syphilis, tuberculosis, and actinomycosis), 5 in which the etiology was not known, and 2 cases originating in an esophageal diverticulum. Melamed and Zimmerman[4] have reported one case of an esophagobronchial fistula which developed through an esophageal diverticulum. They also cite one other case of a fistula occurring between an esophageal diverticulum and the right lower bronchus, reported by Pape[7] in 1934. Thus, in the world literature, reviewed by Monserrat up to 1941, and the American literature from 1941 to 1946, there are apparently only 5 reported instances, including our case, of a fistula communicating between an esophageal diverticulum and the tracheobronchial tree.

TREATMENT

Either surgery or the cauterization method of Clerf may be used in the treatment of these fistulas. Excluded from consideration, of course, are those fistulas which exist as complications of malignancy. General supportive measures, such as prolonged rest of the esophagus by nasal tube feedings or gastrostomy feedings, may be helpful in promoting a tendency toward spontaneous healing of some of the smaller fistulas. Some of the larger fistulas may be best treated surgically by separate ligation of the bronchial or tracheal and the esophageal end of the fistula. Clagett, Payne and Moersch[2] report a case treated successfully by this means. This case was apparently tuberculous in origin.

Clerf, Cooley and O'Keefe[3] report 2 cases of fistula between the esophagus and the right main bronchus which were successfully treated by cauterization of the esophageal end of the fistula by means of sodium hydroxide crystals. The etiology in these cases was not definitely determined. Both cases were free of symptoms for eighteen months following treatment. In one of these cases the fistula was described as being large.

The case of Melamed and Zimmerman was also treated by this method and showed considerable reduction in the size of the fistula when examined about six weeks following a single application of sodium hydroxide. Further treatment was refused by the patient.

PROGNOSIS

The prognosis in these cases, if untreated, is usually poor because of the occurrence of

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pulmonary complications such as pneumonia or lung abscess. A small fistula may be present for some time without producing any symptoms or lung changes. Allen[1] reports 2 cases which were proved roentgenologically and which gave no history suggestive of a fistula. The case presented in this report gave a history of symptoms referable to the esophagobronchial fistula for a period of five years prior to treatment, but showed no roentgen evidence of parenchymal changes in the lungs. Only rarely does a fistula of this type close spontaneously.

CASE REPORT

H. K., male, aged sixty-one, a farmer, was admitted to Ravenswood Hospital in February, 1947. His principal complaint at that time was vague abdominal pain of three months' duration associated with some nausea but no vomiting. Nothing was noted in his past history relative to the respiratory system except what was considered to be an attack of bronchitis or mild pneumonia four years previously. The physical examination was essentially negative except for a palpable mass in the right upper quadrant of the abdomen with some tenderness and muscle resistance in this area. Laboratory studies done at this time included blood morphology and chemistry, Kahn test, and urinalysis which were all normal. Sputum examination showed some gram-positive cocci and an occasional fusiform bacillus. The impression on admission was a possible carcinoma of the ascending colon or gallbladder.

Roentgen Examination. Because of the abdominal complaints and findings, a gastrointestinal roentgen examination was done. At the time of the roentgenoscopic examination of the stomach, the barium was seen entering the right main bronchus from an esophageal diverticulum. A spot film (Fig. 1) made at that time shows the diverticulum with the fistula indicated by the arrow. A portion of the right bronchial tree is outlined by the barium downward from the fistula. The presence of the barium in the bronchial tree initiated an attack of coughing and some retrograde outlining of the right main bronchus and the trachea was seen proximal to the fistula. Figure 2 is a roentgenogram made after the patient swallowed barium and shows a considerable portion of the right middle bronchial tree outlined by barium.

Fig. 1. Spot film made at the time of roentgenoscopy of the stomach after patient had swallowed barium. The esophageal diverticulum is seen communicating by means of a fistulous tract (arrow) with the right main bronchus, which is partly outlined by barium along with a portion of the lower right bronchial tree.

The fistula is indicated by arrows. On the original film from which this photograph was made, there was no evidence of any parenchymal changes in spite of the apparent existence of this fistula for approximately five years prior to this examination. (The probable time of origin of the fistula was determined by more careful questioning of the patient after the diagnosis was made.)

Examination of the colon revealed a lesion of the transverse colon characteristic of a carcinoma which accounted for his original complaints and physical findings.

Additional History and Endoscopic Examinations. After the diagnosis of esophagobronchial fistula had been established, further questioning of the patient revealed a typical history of paroxysmal attacks of coughing and strangling after drinking liquids, especially carbonated

beverages. Lying on his right side also induced coughing and there was usually an attack of coughing upon arising in the morning. This cough was usually productive of mucoid material or some of the substance that the patient had just swallowed. These symptoms had been present over a period of about five years. An attack of pneumonia or influenza had preceded the onset of the symptoms referable to the fistula and a diagnosis of bronchiectasis was made at one time. On one occasion he had a severe paroxysm of coughing along with a "cold" at which time there was some hemoptysis and he also raised some white material which he described as resembling hard plaster.

Bronchoscopy and esophagoscopy were done on February 21, 1947, by Dr. A. H. Andrews, Jr., and the following operative notes were made at that time: "The larynx and tracheobronchial tree were moderately reddened throughout. The carina was normal. At the proximal portion of the right main bronchus on the posterior wall, thick, whitish material appeared. This seemed to be the area of the fistulous opening. The configuration of the tracheobronchial tree was otherwise normal. This thick secretion recurred continuously and could not be satisfactorily aspirated. The esophagus was normal down to just below the level of the aorta where a stenosis was encountered. The scope could not be satisfactorily passed through this area. The orifice of the fistula could not be visualized. The walls did not seem to be hard or infiltrated. There was no bleeding, no ulceration, no granulation tissue, or other evidence of neoplasm."

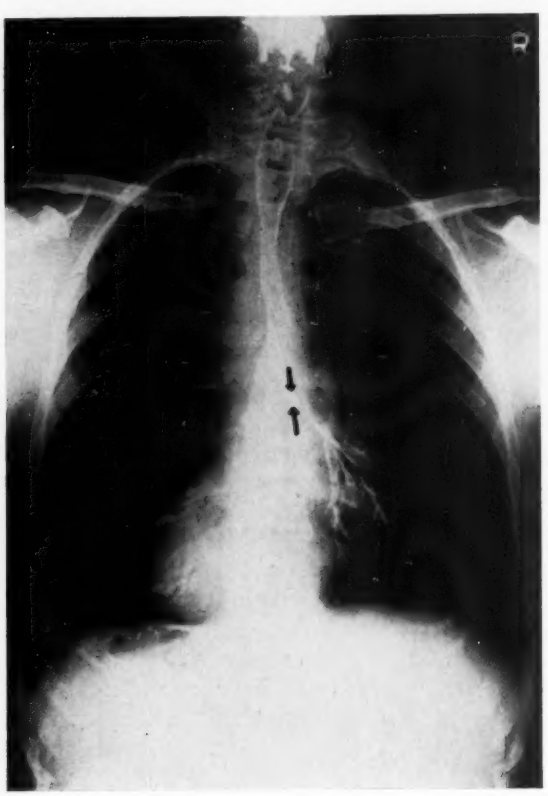

FIG. 2. Roentgenogram made after swallowing barium, showing barium in the right main bronchus and part of the bronchial tree. The fistula is indicated by the arrows.

Treatment. The carcinoma of the colon was resected on February 10, 1947, by Dr. J. J. Ireland, and an end-to-end anastamosis was done. There was no evidence of metastases.

About three months following the bowel resection, the patient was referred to Dr. P. H. Holinger and Dr. A. H. Andrews, Jr., for treatment of the fistula. On April 3, 1947, he received the first cauterization treatment, and the following operative record was made at that time. "Through the photographic esophagoscope, a curved applicator with sodium hydroxide bead on the end was passed into the esophageal fistula and was left in place for two minutes. Following this, 50 cc. of water was poured down the esophagoscope. There was no visible evidence of the cauterizing effect." It was also noted that the fistula was about $\frac{1}{4}$ inch in diameter.

This procedure was repeated six days later, with the sodium hydroxide applicator again being left in place in the fistula for two minutes following which 50 cc. of water was poured through the esophagoscope. He was discharged two days later at which time his symptoms of coughing after swallowing liquids had disappeared.

He returned on April 26, 1947, with some recurrence of his symptoms and the cauterization was repeated, with the bead of sodium hydroxide being left in place for one and a half minutes. It was noted that the fistula appeared smaller. A fourth and last treatment was given on May 17, 1947. No attempt was made to put the esophagus at rest by means of gastrostomy or tube feedings before or during the period of treatment. The patient stated that none of the treatments caused any discomfort or evidence of irritation.

Follow-up. The patient returned for examination on June 17, 1947, two months following the

last cauterization treatment. He had not experienced any recurrence of symptoms, had gained weight, and was fully active in his occupation. An esophagram (Fig. 3) was made after swallowing barium and showed no evidence of the fistulous tract.

On January 14, 1949, this man was again examined. Roentgenoscopically, after swallowing barium there was still no evidence of recurrence of the fistula and the swallowing function was normal. An esophagram (Fig. 4) made at this same time also showed no evidence of recurrence, twenty months after the treatment of the fistula. The patient stated that he is free of any pulmonary symptoms. A complete roentgen examination of the gastrointestinal tract was also done at this time and no evidence of recurrence of the carcinoma of the colon could be found.

Fig. 3. Two months after the last cauterization treatment of the fistula. No evidence of the fistulous tract can be seen. Only a slight protrusion of the esophagus remains to show where the previous communication with the right main bronchus was located (indicated by arrow).

Fig. 4. Esophagram made twenty months after treatment of the fistula. There has been further contraction of esophageal tissue and all that remains to indicate the former location of the fistula is a small diverticulous projection from the esophagus.

SUMMARY

A case of esophagobronchial fistula communicating between an esophageal diverticulum and the right main bronchus is presented along with a brief discussion of the incidence, prognosis and treatment of such cases.

The case reported here was first admitted to the hospital because of vague abdominal complaints of three months' duration. These symptoms were found to be due to a carcinoma of the transverse colon. The esophagobronchial fistula was unsuspected until discovered as an incidental finding at the time of roentgen examination of the gastrointestinal tract. Further questioning of the patient then revealed a typical history of five years' duration, referable to the fistula. In spite of the duration of symptoms for this length of time, no parenchymal changes in the lung were demonstrated by roentgen examination.

Approximately two months after resection of the carcinoma of the colon, cauteri-

zation of the esophagobronchial fistula was started. The cauterizing agent used was sodium hydroxide fused on the end of a curved metal applicator and passed into the esophageal end of the fistula according to the method of Clerf, Cooley and O'Keefe.[3] Four such treatments were carried out over a period of approximately six weeks. The fistula closed promptly. Roentgen examination shows no recurrence of the fistulous tract twenty months after treatment, and the patient has remained free of symptoms during this period.

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MYELOGRAPHY WITH SKIODAN

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IN THE Scandinavian countries myelography of the lower part of the spinal canal in the last few years is for the most part done with a water soluble contrast medium—20 per cent solution of abrodil or skiodan (sodium monoiodomethyl sulfonyl, JCH_2SO_3Na). In Sweden this solution is manufactured under the name of Contrast U (Leo) and in Norway as myelotrast. The advantage of this contrast substance is that it is resorbed completely and thus need not be removed after the examination, and that it can penetrate into all folds of the subarachnoid space and therefore gives more detailed pictures than air and iodized oils. There will also be no late sequelae in the form of chronic arachnoiditis. This method was introduced by Lidström and myself[1] in 1931 and I have since that year used it for investigations of the lumbar portion of the spinal canal, especially for the diagnosis of herniated intervertebral discs. Since I believe it will also be of interest for others to know the technique elaborated, I will give a short description.

The patient is prepared as usual for examination of the lumbar spine (with enema or, if necessary, with castor oil), and is allowed to eat as usual before the examination. Before myelography one makes an intracutaneous injection of about 0.1 cc. of 20 per cent abrodil solution (or better, an intravenous injection of 2 cc. solution) to test the patient's sensitivity to the medium. If the patient shows a strong reaction it will, of course, be better to avoid the investigation. Just before the investigation an ampule of ephedrine is injected. The blood pressure is taken and controlled during the investigation. If it sinks considerably another ampule of ephedrine is injected. Lumbar puncture is performed in the side position with the suspected side down, and the patient is given lumbar anesthesia according to the usual method (at present 2 cc. of a 5 per cent solution of novocain). The head and the upper part of

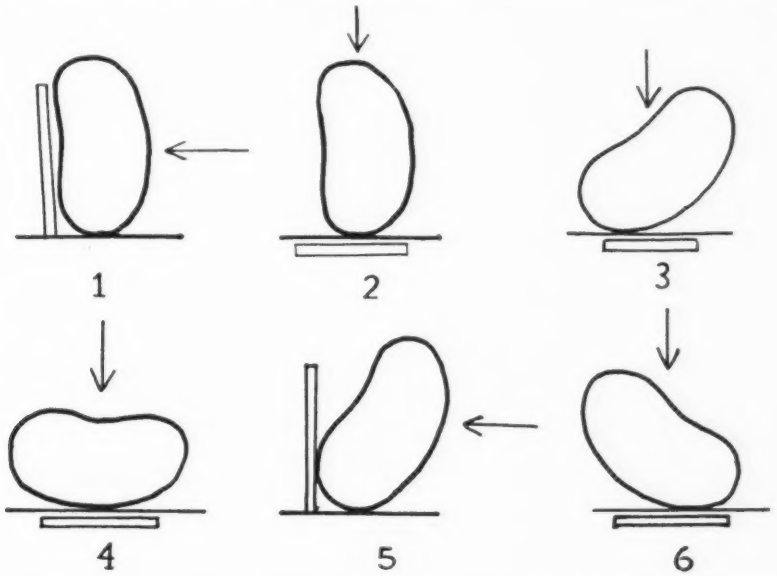

FIG. 1. The position of the patient and the film and the direction of the rays are shown at different moments of the investigation.

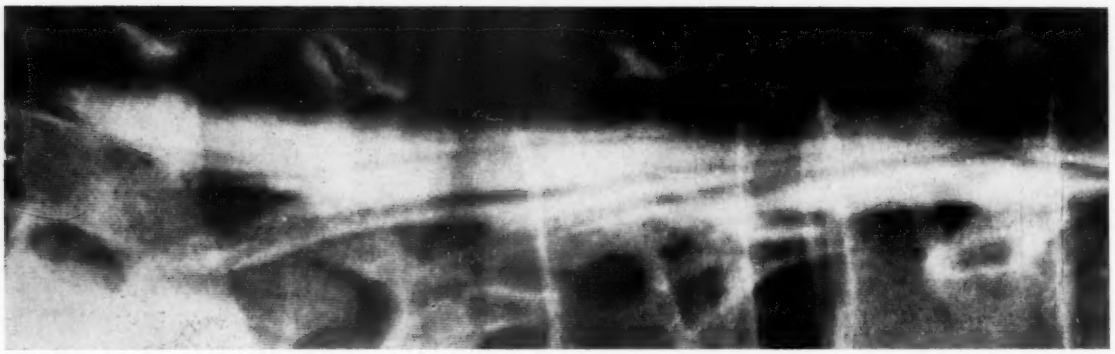

Fig. 2. Oblique view, horizontal rays. Normal picture. Long root pockets on L5 and S1. The dorsal and ventral roots of the latter are separated by a triangular streak of contrast at the peripheral end of the pocket.

the body are held high to ensure that the anesthetic and the contrast medium do not penetrate too high. As soon as the anesthesia is sufficiently deep (after about ten minutes) one makes sure that the needle is still lying in the subarachnoid space and that the spinal fluid is flowing out freely, after which precaution one slowly injects 10 cc. of a 20 per cent solution of abrodil. The lumber needle is then withdrawn and a roentgenogram in the lateral position with the affected side down with horizontal rays is taken immediately (Fig. 1, *1*). Then a roentgenogram is taken in the lateral position with vertical rays (Fig. 1, *2*) and then in the oblique ventral position with the suspected side down and vertical rays (Fig. 1, *3*), and horizontal rays (Fig. 1, *4*). This is followed by films in the ordinary ventral position with vertical rays (Fig. 1, *5*) and the oblique ventral position with the other side down (Fig. 1, *6*).

Fig 3. Subdural injection of the contrast medium; some contrast medium also in the subarachnoid space. Depôt of contrast at the site of the injection.

Fig. 4. Epidural injection of the contrast medium.

One must be careful to see that during the whole time the patient is so placed that the contrast medium will collect in the

lumbosacral area, or, in other words, with this part low. The investigation is made as rapidly as possible. The contrast medium is so rapidly mixed with the spinal fluid and resorbed that, as a rule, one is not able to get another good film at the end of the procedure of development. One must also move the patient as carefully and as little as possible to avoid mixing of the contrast medium with the spinal fluid.

A common accident is the injection of the contrast medium in the subdural space or epidurally.[2] The patient then, as a rule, feels pain at the injection and there will be

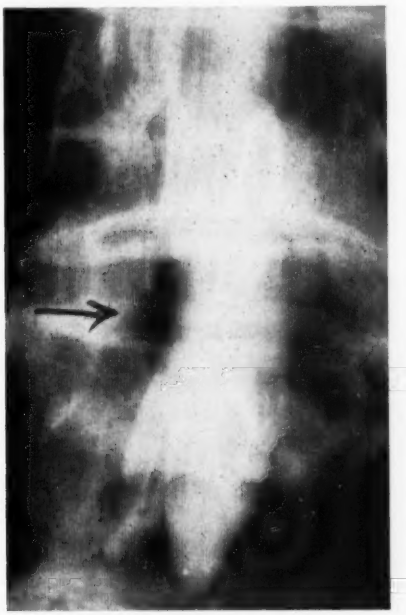

Fig. 5. Disc herniation at L4/L5. The dorsal and ventral roots of S1 separated by a streak of contrast medium.

a failure or an incomplete contrast filling of the subarachnoid space. It is then possible to repeat the lumbar puncture immediately and make a new injection of 10 cc. contrast solution. Figures 3 and 4 show typical roentgenograms obtained after epidural and subdural injection. At the latter the arachnoidea is often perforated by the needle and part of the contrast medium also penetrates into the subarachnoid space.

For the correct understanding of the roentgenograms obtained, it is of importance to know the normal anatomy and the most common variations in this part of the body.[2] The arachnoid sac varies greatly in form: from broad, clumsy sacs with a blunt, almost half-spherical termination,

Fig. 6. Disc herniation at L5/S1 with increase in the breadth of the root due to compression.

Fig. 7. Irregular deformation of the root pocket of S1 and the root. Laterally is seen a defect in the contrast medium of the size of a pinhead, probably a cyst. Suspected arachnoiditis proliferans et cystica.

to slender sacs with a sharp, conical point. The length varies also and the termination is somewhere between L5/S1 and S3/S4, mostly between S1/S2 and S2/S3. The root pockets (the tube-like continuation of the subarachnoid space into the root sheaths) also vary and a symmetrical development is rather an exception. The root pockets of the lower lumbar roots are, as a rule, the longest. In the root pockets the ventral and dorsal roots are often separated by a streak of contrast medium. This streak often widens peripherically to a triangular formation (Fig. 2 and 5), often with a drop-like termination. The peripheral end of the root pocket mostly consists of lace-like tips, sometimes the ending is more blunt, giving a drop-like termination on the roentgenogram.

Fig. 8. Irregular deformation of the root pockets of L5 and S1, probably due to arachnoiditis proliferans et cystica.

The medial posterior disc herniations give a characteristic impression in the subarachnoid contrast and often also compression of the nerve root in the root pocket, resulting in a broadening of its shadow (Fig. 6). The lateral posterior disc herniations, on the other hand, often do not show any visible deformation on the myelogram.

A disease that probably will give visible signs on the myelogram is arachnoiditis proliferans et cystica spinalis, the histopathological picture of which is described by Rexed.[3] The roentgenological signs of this should be deformations of the root pockets and root threads by the arachnoid proliferations (Fig. 7 and 8). With this method it should be possible to see these deformations in some cases, as well as other finer details in the lumbar part of the subarachnoid space.

For examination of the upper part of the spinal canal this method is not suitable, as the solution has too high an osmotic pressure and there will be considerable risk of fatal complications if it is introduced in the basal cisterns.

It is also of great importance to use a pure contrast substance without free iodine, as this latter irritates the meninges. Finally, I must warn against the use of solutions with more than 20 per cent contrast salt; the risk of complications will be great with more concentrated solutions.

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EFFECT OF ANTISPLENIC TISSUE SERUM ON ROENTGEN-RAY DAMAGE (WHOLE BODY IRRADIATION)*

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OUR investigations of the role of the so-called reticulo-endothelial system in resistance to disease and maintenance of normal function have included studies on the stimulation of the healing rate of experimental wounds by antispleen serum.[6,7]

In evaluating the mode of action of such antiserums there was noted a marked stimulation of the blood-forming system and a consequent increase in granulation tissue factors. Miale[8] demonstrated that antispleen serum caused a prompt and sustained increase in circulating mononuclear cells, confirming our observations on the wounds.

The following experiment was undertaken to ascertain whether such antiserums were effective in assisting recovery from the damage to the reticulo-endothelial system caused by whole body roentgen irradiation. It is known that irradiation lowers the natural resistance of animals to infectious agents. Zinsser and Ruiz Castañeda,[9] and Liu, Snyder and Enders[5] demonstrated that irradiated animals are more sensitive to rickettsial infections. It was felt that this phenomenon might provide a means of determining whether antispleen serum was of value in counteracting irradiation-accelerated susceptibility to rickettsial infections.

Animal Colony. A heterologous line of Swiss-albino mice was used in these studies. Mice were controlled for enteric infections* and latent parasitism, e.g., *Bartonella.* The mouse strain was derived from breeders previously treated with salvarsan and housed under careful quarantine from other strains. No blood parasites were found in 200 mice irradiated and examined as controls. Throughout the experiment, mice weighing 12 to 15 gm. were used, distributed into groups of equivalent sex and age. In none of our control observations were intercurrent or latent infections found. Each mouse was housed in an individual jar throughout the experiment to further control herd infections.

Irradiation Procedure and Dose. A simple device for uniform irradiation of groups of mice, designed by one of us[3] was used. Irradiation factors employed were: 250 kv., 15 ma., 50 cm. distance, 0.5 mm. copper and 1.0 mm. aluminum filters, open portal, half-value layer equivalent to 1.5 mm. copper, dosage rate 64 r per minute. All exposures were single dose, total body irradiation. Each exposure level represented a longer time interval at a fixed dosage rate. Irradiation was administered to groups of 10 to 20 mice each, on different occasions to insure uniformity of radiation effects.

Establishment of Lethal Dose. In addition to the exposures described in Table 1, five groups of 12 mice each were exposed to large roentgen-ray doses ranging from 600 r (in air) to 2,000 r (in air) respectively. In each group, 100 per cent death occurred, thus confirming 600 r as the lower limit lethal radiation dose in our strain. Autopsies were performed on all mice dying after irradiation and damage was confirmed by histological examination of the spleen,[1] liver[2] and adrenal. All animals were observed for a period of thirty days for survival. With increasing radiation dose, deaths occurred in a shorter time after

* Determined with MacConkey agar, Albimi Laboratories Brooklyn, N. Y.

* Performed under contract with the Atomic Energy Commission and the Office of Naval Research, Contract N8-onr-65600.
† Biological Laboratories, Inc., Brooklyn, N. Y.
‡ New York University Post-Graduate Medical School, Department of Radiology, New York, N. Y.

exposure, i.e., most of the mice died in twelve to fourteen days after 200 r with only a small number occurring earlier, whereas in the 600 r group 80 per cent died by the eighth day.

Rickettsial Agent. A strain designated Rickettsia Pox, originally isolated from an outbreak in Kew Gardens, New York, was cultivated in chick egg yolk sacs, harvested and stored in a 2.5 per cent skimmed milk suspension at −70° C.* Determinations of the LD_{50} of this suspension were made prior to and parallel with each experiment in which infection was employed. Titrations were done in mice of the same strain, age, weight and sex distribution as used in the experiments. Groups of 6 mice each were injected intravenously with 0.25 cc. of each dilution prepared in ice cold saline buffered with phosphate at pH 7.0. At all times during handling the Rickettsial Pox suspensions were kept cold. Tubes, syringes, solutions, etc., were all kept at 8° to 10° C. until the moment of use.

The LD_{50} dose of Rickettsia Pox remained constant with the exception of one harvest lot in which the virulence was reduced. This latter was discarded along with the experiment in which it was employed. Rickettsial infection was checked at autopsy by Macchiavello stained smears of the liver and the peritoneal wall.

Preparation of Antiserums. The spleens of the sacrificed normal mice were removed aseptically, cut and washed in sterile saline, and finally emulsified in a Waring blender in a 20 per cent suspension. Normal rabbits were immunized with this spleen suspension by six intravenous injections at five day intervals. Ten days after the last injection blood was obtained by cardiac puncture and the serum separated. The antiserum complement was inactivated by heat at 56° C. for one-half hour and subsequently absorbed with normal mouse erythrocytes to remove any anti-erythrocyte antibodies. The antiserum was titrated by the Kolmer complement fixation test.[4] Current experiments by one of us (N.M.) indicate that the complement fixing titer bears only a gross relationship to the biologically effective dose as measured by acceleration of wound healing rate.[7] Therefore the antiserum was further controlled by a biological titration in normal wounded mice. In two experiments the antiserum used did not stimulate the healing of wounds despite a complement fixing action in vitro. These two experiments were discarded from the results reported.

TABLE I

Total Dose r in air	Time Exposed	Total No. of Mice	Mortality in 30 Days	Day of Death (after irradiation)
200	3 min. 7 sec.	84	11%	8 to 14
300	4 min. 42 sec.	84	22%	6 to 14
400	6 min. 15 sec.	108	56%	4 to 14
500	7 min. 48 sec.	84	70%	4 to 14
600	9 min. 20 sec.	110	95%	2 to 10

Determination of Combined Effect of Roentgen-Ray Exposure and Rickettsia Pox Infection. Titrations of the infecting dose of Rickettsia Pox consistently indicated that 1/100 of the LD_{50} dose did not cause death in any of the normal mice. It was found that in 58 mice exposed to 200 r and infected with 10^{-7} dilution of Rickettsia Pox, 21 per cent died as compared with 10 per cent mortality due to this radiation dose without infection. In 101 mice exposed to 300 r and infected with 10^{-7} dilution of Rickettsia Pox, 62 per cent died as compared with 22 per cent mortality due to this radiation dose without infection. It was therefore decided to utilize 300 r radiation dose and 10^{-7} dilution of Rickett-

*Obtained from Drs. H. Cox and S. Wong, Lederle Laboratories, Pearl River, N. Y.

sia Pox (1/100 LD_{50} dose) to test whether the antispleen serum had any effect.

Effect of Antispleen Serum on Irradiated, Infected Mice. A total of 510 mice were exposed to 300 r total body irradiation, infected with a 10^{-7} dilution of Rickettsia Pox dose and divided into 3 groups: untreated, treated with normal rabbit serum, and treated with 1/100 unit of antispleen serum.* These experiments were repeated on groups of 40 to 50 mice. The results of the separate trials did not deviate significantly from each other.

Prior to each experiment the antiserum used was retitrated by complement fixation

TABLE II

Treatment	Total No. Mice	No. Mice Died (30 days)	Mortality Per Cent
None	140	91	65
Normal rabbit serum	185	105	57
Antispleen serum	185	115	62

and its biological action on the healing rate of wounds in normal mice tested. The Rickettsia Pox was titrated to check the LD_{50} dose in normal mice infected with dilutions of 10^{-4}, 10^{-5}, 10^{-6}, and 10^{-7}. In addition, parallel with each experiment a group of 6 normal mice were infected with infecting dose of Rickettsia Pox used (10^{-7}) dilution to control its non-lethal effect. All dying mice were autopsied and examined to eliminate deaths due to extraneous causes; smears for Rickettsia and histological examination of the spleen were done as described above. In two experiments the control on the biological effect of the antiserum indicated that the antiserum was inactive. These data were therefore not included in our results.

SUMMARY

It is apparent that antispleen serum under the conditions used did not affect the increased susceptibility of mice to Rickettsia Pox infection caused by whole body irradiation damage, using an exposure of 300 r (in air).

In view of our previous findings on the stimulating effect of antispleen serum on the reticulo-endothelial system,[6,7] it seemed tenable that a similar stimulation would occur in these experiments. The results show clearly that no demonstrable effect occurred. It is possible that the combined damage from irradiation and infection may have been too great for the degree of stimulation of this system alone and the experiment may not be determinative.

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* Unitage of antiserum was based on complement fixing titer, e.g., serum titer 1:100 contains 100 units per cubic centimeter.

ESSENTIALS OF STEREOSCOPIC ROENTGENOGRAPHY

By LEWIS E. ETTER, M.D.*
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THERE are few procedures in the everyday practice of roentgenology about which there is less uniformity and more confusion than stereoscopic roentgenography. The subject has been dealt with adequately in several texts, but it has seemed to the author that the procedure is not entirely clear to all who are obliged to deal with stereoscopic views. It has been said that there are only two really correct ways of producing and viewing a stereoscopic pair of films and that there are at least ten incorrect ways of doing it. These other views which sometimes appear to "stereo" are only pseudoscopic and cannot give the information often available by means of true stereoscopy.

In order to make this special technique clear to the residents in neuropsychiatry or anyone concerned with the production and interpretation of stereoscopic pneumoencephalograms and other films of the skull, the accompanying diagram (Fig. 1) was designed to show the geometrical relations involved and a simple way of reproducing this set of relations in a pair of stereoscopic roentgenograms to be sure of obtaining a correct result.

One essential requirement is to imagine yourself viewing the part to be filmed from the tube aspect, and to imagine the shift of the tube to the left to correspond to your left eye position, and the shift to the right to correspond to your right eye position. In this way it will readily be appreciated that films with unequal margins on the sides corresponding to the direction of the shift will be produced. When the tube has been shifted to the left, the narrow part-film margin is on the right; when shifted to the right, the part-film margin on this side becomes wider. The former is the left eye film, the latter the right eye film and should be so placed, reversed, in the stereoscopic viewing boxes.

The other essential requirement is always to place the label or identification marker facing upward to be read from left to right on the table or tunnel top with its long axis in the direction of the tube shift. This obviates the use of arrows to indicate shift direction which can be deduced from the position of the unequal part-film margins. However, the additional indication of an arrow is helpful to show at a glance direction of the tube shift. With this position of the marker in use the tube side of any film can be determined at once, and by comparison with its mate the left and right tube shifts determined. Then all that remains to be done is to place the film corresponding to the left eye—left tube shift, in the left viewing box, reversed, and the remaining film, reversed, in the right. Now the images will invariably fuse in one stereoscopic image with the label reading directly from left to right exactly as it was placed in relation to the parts and tube during roentgenography.

It was stated above that there are two ways to obtain correct stereoscopy. This is so because one may consider that he views the setup of any given position from either the right or left side of the patient. If, as in the present example, the shift is across the table and the long axis of the skull, it would make no difference; but if the shift were vertical along the long axis of the table, the left and right eye films would be different for each side of the table. Both would be correct from the aspect viewed and each could be verified if the labels were placed facing upward to read from left to right and in the long axis of the shift. The principle to be observed in either case is that the geometrical situation of the part and label with reference to the roentgen tube must be exactly reproduced

* Roentgenologist, Western Psychiatric Institute and Clinic, University of Pittsburgh Medical Center.

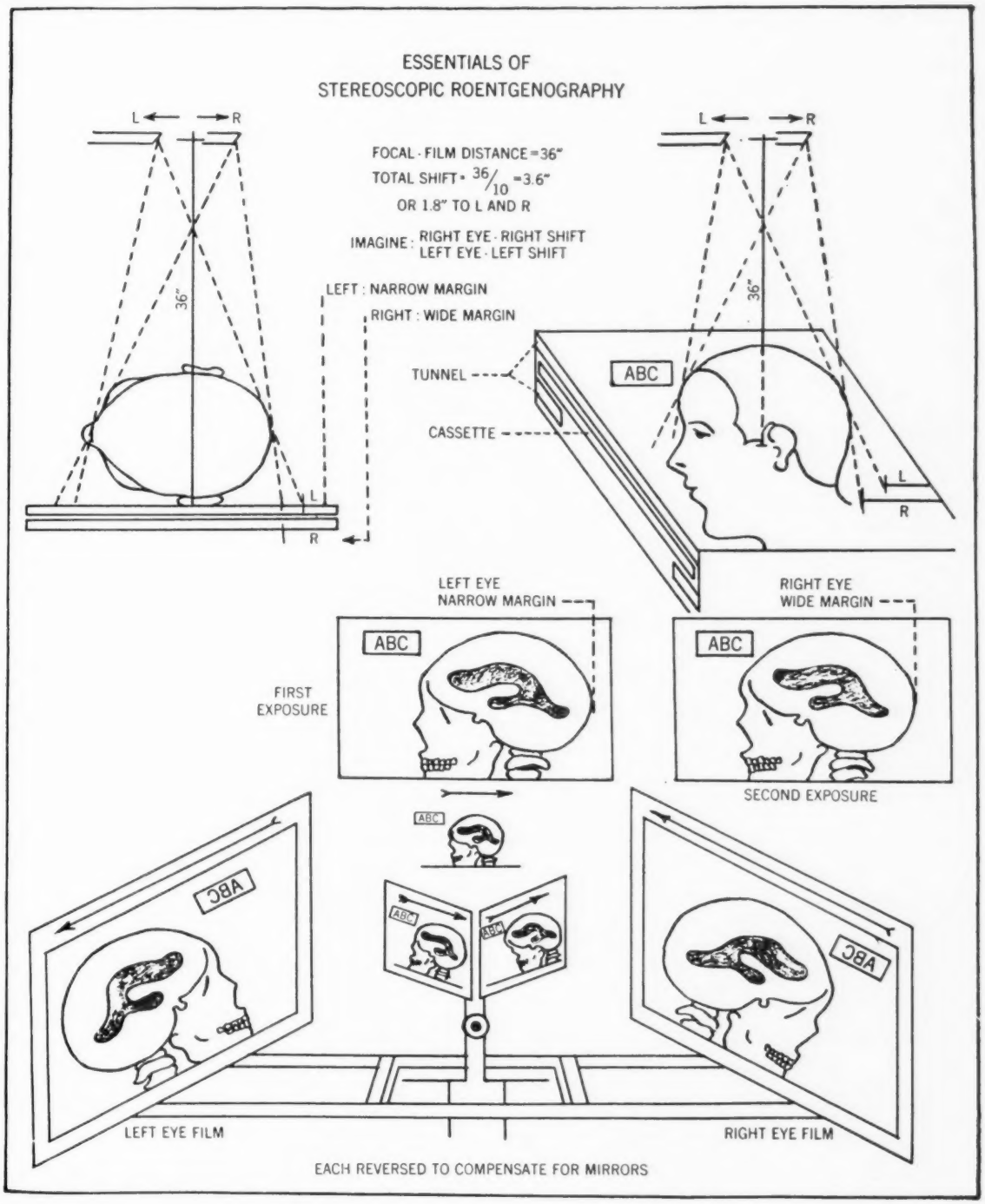

Fig. 1

in the fused stereoscopic image.

Rules about reversing and superimposing films and then drawing the one with the image nearer the right hand, etc., only cloud this simple geometric situation and lead to confusion. One who clearly sees the geometrical setup and how it can easily be reproduced needs nothing more.

The amount of tube shift with relation to distance of target and film has been care-

fully worked out by Wilsey and others and is taken to be approximately one-tenth of the focal film distance, when viewed at the usual mirror-film distance of 25 to 30 inches.

All stereoscopic views should be made with the marker facing upward toward the tube and to read from left to right so that correct stereoscopy may be verified when the label can be read in correct position with relation to the other parts in the fused stereoscopic image. The skull and pneumoencephalogram have been used as an example of this procedure. It is equally applicable to any part or any direction of shift if the above essential requirements are observed.

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Fifty-second Annual Meeting: Shoreham Hotel, Washington, D. C., September 25–28, 1951.

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Thirty-fourth Annual Meeting, 1952: To be announced.

EDITORIAL

ANNUAL MEETING OF THE AMERICAN ROENTGEN RAY SOCIETY

THE Fifty-second Annual Meeting of the American Roentgen Ray Society will be held in Washington, D. C., on September 25, 26, 27 and 28, 1951. The Society returns to Washington after a lapse of many years, the last meeting there being held in 1925. This year's meeting will be held at the Shoreham Hotel, situated on beautiful Rock Creek Park, one of the splendid parks that Washington boasts of. The hotel itself has excellent facilities for the meeting as well as being located in beautiful surroundings with spacious lawns and at a short distance from the downtown section of Washington. The scientific activities of the meeting will occupy the two lower floors of one wing of the hotel, thus assuring easy access to the Meeting Room, to the Scientific and Commercial Exhibits and to the Instruction Courses.

The Program Committee under the chairmanship of President-Elect H. Dabney Kerr has assembled a scientific program which will be of universal interest. The Preliminary Program as outlined by Dr. Kerr and his committee appears elsewhere in this issue of the JOURNAL, and one may readily see from a perusal of this program that it will make an especial appeal to each and every member of the Society and their guests.

The Instruction Courses which are always a most rewarding feature of the annual meetings are again being given under the directorship of Dr. Harry M. Weber. Dr. Weber has selected a distinguished faculty of radiologists who will offer courses dealing with radiology in all of its phases. The summary of the Instruction Courses is published elsewhere in this issue of the JOURNAL, and those who plan to take the courses should at once make their selection and, as requested by Dr. Weber, mail their order sheets directly to him at the address given.

This year's Caldwell Lecture will be delivered on Tuesday evening, September 25, by Dr. Wilder Penfield, Professor and Director of the Department of Neurology and Neurosurgery, McGill University, and Director of Montreal Neurological Institute, Montreal, Canada. Dr. Penfield has chosen as the topic of his lecture "Cranial Clues to Abnormalities of Brain and Dura." Professor Penfield is one of the outstanding neurosurgeons of the world and the Caldwell Lecture which is to be given by him should in itself be of sufficient attraction to warrant attending this year's meeting of the American Roentgen Ray Society.

Dr. Kerr and his Program Committee have included as part of their scientific program two symposiums. One of these symposiums has been arranged by Dr. Lauriston S. Taylor, Chief of the Radiation Physics Laboratory of the National Bureau of Standards, Washington, D. C. This symposium should be extremely valuable to all those who are interested in radiation therapy. The symposium has an added interest since the year 1951 marks the Fiftieth Anniversary of the National Bureau of Standards. Many of the principal scientific and technical organizations of the nation have arranged meetings in Washington during this year to honor the Bureau's semicentennial. The Bureau itself has planned many exhibits which will be of interest to visiting scientists, and the Bureau is holding open house on Wednesday eve-

ning, September 26, for the members and guests who are attending the meeting of the American Roentgen Ray Society.

A second extremely interesting symposium, dealing with intracranial lesions, has been arranged by Dr. Carleton B. Peirce of Montreal, Canada. Some idea of the extent and importance of this symposium may be gained by consulting the Preliminary Program.

Dr. C. Allen Good and his Scientific Exhibit Committee have gathered together an excellent group of scientific exhibits, which always give an added interest to the Society's annual meetings, and the manufacturers have made reservations in the Commercial Exhibit for an unusually large and comprehensive display of radiological and accessory apparatus.

The Committee on Local Arrangements headed by Dr. Ralph M. Caulk has arranged an excellent program of entertainment for the ladies and members and guests. On Thursday evening will be held the Annual Banquet, which is one of the outstanding social events of the meeting. On Monday, September 24, will be held the Annual Golf Tournament for members and their guests. This year's tournament will take place at the Congressional Country Club, and the competition will be for the Willis F. Manges Trophy (eighteen hole medal handicap, for members) and the Exhibitors' Trophy (eighteen hole gross score, for members and guests). Following the Golf Tournament the annual Golf Dinner will be held at the Congressional Country Club.

It is anticipated that this year's meeting in Washington will be well attended, and it is earnestly requested that those who are planning to go to the meeting make their hotel reservations at once. Reservations should be made directly with the Shoreham Hotel.

SOCIETY PROCEEDINGS, CORRESPONDENCE AND NEWS ITEMS

MEETINGS OF ROENTGEN SOCIETIES*

United States of America

American Roentgen Ray Society
Secretary, Dr. Barton R. Young, Germantown Hospital, Philadelphia 44, Pa. Annual meeting: Shoreham Hotel, Washington, D.C., Sept. 25–28, 1951.

American Radium Society
Secretary, Dr. J. E. Wirth, 635 Herkimer St., Pasadena 1, Calif. Annual meeting, 1952: To be announced.

Radiological Society of North America
Secretary, Dr. D. S. Childs, 713 E. Genesee St., Syracuse 2, N. Y., Annual meeting: Palmer House, Chicago, Ill., Dec. 2–7, 1951.

American College of Radiology
Executive Secretary, William C. Stronach, 20 N. Wacker Drive, Chicago 6.

Section on Radiology, American Medical Association
Secretary, Dr. T. Leucutia, Harper Hospital, Detroit 1, Mich.

Alabama Radiological Society
Secretary, Dr. W. W. Anderson, Tuscaloosa, Ala. Meets time and place Alabama State Medical Association.

Arizona Radiological Society
Secretary, Dr. R. Lee Foster, 507 Professional Building, Phoenix, Ariz. Two regular meetings a year. The annual meeting at time and place of State Medical Association and interim meeting six months later.

Arkansas Radiological Society
Secretary, Dr. Fred Hames, 511 National Bldg., Pine Bluff, Ark. Meets every three months and also at time and place of State Medical Association.

Atlanta Radiological Society
Secretary, Dr. J. D. King, 35 Linden Ave., N.E., Atlanta, Ga. Meets monthly, except during three summer months, on second Friday evening.

Brooklyn Roentgen Ray Society
Secretary, Dr. J. J. Daversa, 345 75th St., Brooklyn, N. Y. Meets monthly fourth Tuesday, Oct. through April.

Buffalo Radiological Society
Secretary, Dr. Mario C. Gian, 610 Niagara St., Buffalo, N. Y. Meets second Monday evening each month, October to May inclusive.

Central New York Roentgen Ray Society
Secretary, Dr. Dwight V. Needham, 608 E. Genesee St., Syracuse N. Y. Meets January, May, November.

Central Ohio Radiological Society
Secretary, Dr. F. A. Riebel, 15 West Goodale St., Columbus, Ohio. Meets at 6:30 P.M. on second Thursday of October, December, February, April, and June at Columbus Athletic Club, Columbus, Ohio.

Chicago Roentgen Society
Secretary, Dr. B. D. Braun, 6 N. Michigan Ave., Chicago 2, Ill. Meets second Thursday of each month, October to April inclusive at the University Club.

Cleveland Radiological Society
Secretary, Dr. J. R. Hannan, 10515 Carnegie Ave., Cleveland 6, Ohio. Meetings at 6:45 P.M. on fourth Monday of each month from October to April.

Colorado Radiological Society
Secretary, Dr. Paul E. RePass, 306 Republic Bldg., Denver 2, Colo. Meets third Friday of each month at University of Colorado Medical Center or at Denver Athletic Club.

Connecticut Valley Radiologic Society
Secretary, Dr. E. W. Godfrey, 1676 Boulevard, West Hartford, Conn. Meets second Friday Oct. and April.

Dallas-Fort Worth Roentgen Study Club
Secretary, Dr. X. R. Hyde, Medical Arts Bldg., Fort Worth, Texas. Meets in Dallas on odd months and in Fort Worth on even months, on third Monday, 7:30 P.M.

Detroit Roentgen Ray and Radium Society
Secretary, Dr. J. C. Cook, Harper Hospital. Meets monthly on first Thursday from October to May, at Wayne County Medical Society Building.

East Bay Roentgen Society
Secretary, Dr. Dan Tucker, 434-30th St., Oakland 9, Calif. Meets first Thursday each month at Peralta Hospital, Oakland.

Florida Radiological Society
Secretary, Dr. Nelson T. Pearson, 1109 Huntington Bldg., Miami, Fla. Meets twice annually, in the spring with the annual State Society meeting, and in the fall.

Georgia Radiological Society
Secretary, Dr. R. C. Pendergrass, Americus, Ga. Meets in mid-winter and at annual meeting of Medical Association of Georgia in the spring.

Greater Miami Radiological Society
Secretary, Dr. T. M. Berman, 350 Lincoln Rd., Miami Beach, Florida. Meets last Wednesday of each month at 8:00 P.M. at Veterans Administration Regional Office.

Houston Radiological Society
Secretary, Dr. F. M. Windrow, 1205 Hermann Professional Bldg., Houston, Texas. Meets fourth Monday each month.

Illinois Radiological Society
Secretary, Dr. Wm. DeHollander, St. John's Hospital, Springfield, Ill. Meets three times a year.

Indiana Roentgen Society
Secretary, Dr. William M. Loehr, 712 Hume-Mansur Bldg., Indianapolis 4. Meets second Sunday in May.

Iowa X-Ray Club
Secretary, Dr. Arthur W. Erskine, 326 Higley Bldg., Cedar Rapids, Iowa. Luncheon and business meeting during annual session of Iowa State Medical Society.

Kansas Radiological Society
Secretary, Dr. Anthony F. Rossitto, Wichita Hospital, Wichita, Kan. Meets annually with State Medical Society.

Kentucky Radiological Society
Secretary, Dr. E. L. Pirkey, Louisville General Hospital, Louisville 2, Ky. Meets monthly on second Friday at Seelbach Hotel, Louisville.

Kings County Radiological Society
Secretary, Dr. Marcus Wiener, 1430-48th St., Brooklyn, N. Y. Meets Kings County Med. Soc. Bldg. monthly on fourth Thursday, October to May, 8:45 P.M.

Los Angeles Radiological Society
Secretary, Dr. Wybren Hiemstra, 1414 S. Hope St., Los Angeles 15, Calif. Meets second Wednesday each month at Los Angeles County Medical Assn. Building.

Louisiana Radiological Society
Secretary, Dr. J. R. Anderson, 1130 Louisiana Ave., Shreveport. Meets annually during Louisiana State Medical Society Meeting.

Maine Radiological Society
Secretary, Dr. C. F. Miller, Central Maine General Hospital, Lewiston, Maine.

Miami Valley Radiological Society
Secretary, Dr. G. A. Nicoll, 134 Apple St., Dayton, Ohio. Meets second Friday of fall and winter months.

* Secretaries of societies are requested to send timely information promptly to the Editor.

Michigan Association of Roentgenologists
Secretary, Dr. R. D. McDuff, 220 Genesee Bank Bldg., Flint 3, Mich.

Mid-Hudson Radiological Society
Secretary, Dr. J. W. Walton, Horton Memorial Hospital, Middletown, N. Y. Meets 8:30 P.M., fourth Tuesday each month, Sept. to May.

Milwaukee Roentgen Ray Society
Secretary, Dr. T. J. Pfeffer, 839 N. Marshall St., Milwaukee 2, Wis. Meets monthly on second Monday at University Club.

Minnesota Radiological Society
Secretary, Dr. L. A. Nash, 572 Lowry Medical Arts Bldg., St. Paul 2, Minn. Meets three times annually, once at time of State Med. Assn., and in spring and fall.

Mississippi Radiological Society
Secretary, Dr. John W. Evans, 621 High Street, Jackson 2, Miss. Meets third Thursday of each month at the Rotisserie Restaurant at 6:30 P.M.

Nebraska Radiological Society
Secretary, Dr. R. W. Blanchard, 1216 Medical Arts Bldg., Omaha, Nebr. Meets fourth Thursday of each month at 6 P.M. at Omaha or Lincoln.

New England Roentgen Ray Society
Secretary, Dr. L. L. Robbins, Massachusetts General Hospital, Boston, Mass. Meets monthly on third Friday, Harvard Club.

New Hampshire Roentgen Ray Society
Secretary, Dr. A. C. Johnston, Elliott Community Hospital, Keene, N. H. Meets four to six times yearly.

New York Roentgen Society
Secretary, Dr. J. L. Olpp, 49 Ivy Lane, Tenafly, N. J. Meets monthly on third Monday, New York Academy of Medicine, at 8:30 P.M.

North Carolina Radiological Society
Secretary, Dr. J. E. Hemphill, 1420 E. Fifth St., Charlotte 4, N. C. Meets in May and October.

North Dakota Radiological Society
Secretary, Dr. C. O. Heilman, 807 Broadway, Fargo. Meetings by announcement.

Northeastern New York Radiological Society
Secretary, Dr. John F. Roach, Albany Hospital, Albany, N. Y. Meets four times a year, the times being announced by the Secretary.

Northern California Radiological Club
Secretary, Dr. G. A. Fricker, Sacramento County Hospital, Sacramento, Calif. Meets at dinner last Monday, every second month, except June, July and August.

Ohio State Radiological Society
Secretary, Dr. E. C. Elsey, 927 Carew Tower, Cincinnati 2, Ohio. Meets Ft. Hayes Hotel, Columbus, Ohio, May 25–27, 1951.

Oklahoma State Radiological Society
Secretary, Dr. W. E. Brown, 21st & Xanthus, Tulsa 4, Okla. Three regular meetings annually.

Oregon Radiological Society
Secretary, Dr. C. T. Jessell, 214 Medical-Dental Bldg., Portland 5, Oregon. Meets monthly 2nd Wednesday, 8:00 P.M.

Orleans Parish Radiological Society
Secretary, Dr. Joseph V. Schlosser, Charity Hospital, New Orleans 13, La. Meets first Tuesday of each month.

Pacific Northwest Radiological Society
Secretary, Dr. S. J. Hawley, 1320 Madison St., Seattle 4, Wash. Meets annually in May.

Pacific Roentgen Society
Secretary, Dr. L. H. Garland, 450 Sutter St., San Francisco, Calif. Meets annually, during meeting of California Medical Association.

Pennsylvania Radiological Society
Secretary, Dr. J. M. Converse, 416 Pine St., Williamsport.

Philadelphia Roentgen Ray Society
Secretary, Dr. G. P. Keefer, American Oncologic Hospital, Philadelphia 4, Pa. Meets first Thursday each month October to May, at 8:00 P.M., in Thomson Hall, College of Physicians.

Pittsburgh Roentgen Society
Secretary Dr. E. J. Euphrat, 3500 Fifth Ave., Pittsburgh 13, Pa. Meets 6:30 P.M. at Webster Hall Hotel on second Wednesday each month, October to May inclusive.

Radiological Section, Baltimore Medical Society
Secretary, Dr. Richard B. Hanchett, 705–6 Medical Arts Bldg., Baltimore, Md. Meets third Tuesday each month, Sept. to May.

Radiological Section, Connecticut Medical Society
Secretary, Dr. Fred. Zaff, 135 Whitney Ave., New Haven, Conn. Meets bimonthly on second Wednesday.

Radiological Section, District of Columbia Medical Society
Secretary, Dr. W. M. Clopton, 3929 Oliver St. N.W., Washington 15, D. C. Meets Medical Society Auditorium, third Thursday, Jan., March, May, Oct. at 8:00 P.M.

Radiological Section, Southern Medical Association
Secretary, Dr. Roy G. Giles, Temple, Texas.

Radiological Society of Greater Cincinnati
Secretary, Dr. L. J. Gibboney, 831 Carew Tower, Cincinnati 2, Ohio. Meets first Monday each month, at 7:30 P.M., September to May, inclusive.

Radiological Society of Kansas City
Secretary, Dr. Arthur B. Smith, 800 Argyle Bldg., Kansas City, Mo. Meets third Thursday of each month.

Radiological Society of New Jersey
Secretary, Dr. Nicholas G. Demy, 912 Prospect Avenue, Plainfield, N. J. Meets annually at Atlantic City at time of State Medical Society and mid-winter at Elizabeth, N. J.

Rochester Roentgen Ray Society, Rochester, N. Y.
Secretary, Dr. George Gamsu, 191 S. Goodman St., Rochester, N. Y. Meets monthly on last Monday from September through May, 8 P.M. at Strong Memorial Hospital.

Rocky Mountain Radiological Society
Secretary, Dr. Maurice D. Frazer, 1037 Stuart Bldg., Lincoln, Nebr. Meets August 9, 10, 11, 1951, Shirley-Savoy Hotel, Denver, Colorado.

St. Louis Society of Radiologists
Secretary, Dr. D. S. Bottom, 510 S. Kingshighway, St. Louis, Mo. Meets fourth Wednesday each month, except June, July, August, and September.

San Diego Roentgen Society
Secretary, Dr. R. F. Niehaus, 1831 Fourth Ave., San Diego, Calif. Meets monthly, first Tuesday at dinner.

Section on Radiology, California Medical Association
Secretary, Dr. D. R. MacColl, 2007 Wilshire Blvd., Los Angeles 5, Calif.

Section on Radiology, Illinois State Medical Society
Secretary, Dr. Harold L. Shinall, St. Joseph's Hospital, Bloomington, Ill.

Shreveport Radiological Club
Secretary, Dr. R. W. Cooper, Charity Hospital, Shreveport, La. Meets monthly on third Wednesday, at 7:30 P.M., September to May inclusive.

South Bay Radiological Society
Secretary, Dr. Charles E. Duisenberg, 300 Homer Avenue, Palo Alto, Calif. Meets second Tuesday each month.

South Carolina X-Ray Society
Secretary, Dr. Henry E. Plenge, Spartanburg General Hospital, Spartanburg, S. C. One meeting with South Carolina Medical Association in May, others arranged by President.

Tennessee Radiological Society
Secretary, Dr. J. M. Frère, 707 Walnut St., Chattanooga, Tenn. Meets annually at the time and place of the Tennessee State Medical Association.

Texas Radiological Society
Secretary, Dr. R. P. O'Bannon, 650 Fifth Ave., Fort Worth 4, Texas. Meets Houston, Texas, Jan. 18 and 19, 1952.

University of Michigan Department of Roentgenology Staff Meeting
Meets each Monday evening from September to June, at 7 P.M. at University Hospital.

University of Wisconsin Radiological Conference
Secretary, Dr. E. A. Pohle, 1300 University Ave., Madison, Wis. Meets first and third Thursdays 4:00 to 5:00 P.M., September to May inclusive. Room 203, Service Memorial Institute, 426 N. Charter St., Madison.

Utah State Radiological Society
Secretary, Dr. Angus K. Wilson, 343 S. Main St., Salt Lake City 1, Utah. Meets third Wednesday in September, November, January, March and May.

Virginia Radiological Society
Secretary, Dr. P. B. Parsons, Norfolk General Hospital, Norfolk, Va. Meets annually in October.

Washington State Radiological Society
Secretary, Dr. R. C. Kiltz, 705 Medical-Dental Bldg., Everett, Wash. Meets fourth Monday each month, October through May, College Club, Seattle.

Wisconsin Radiological Society
Secretary, Dr. Irving I. Cowan, 425 E. Wisconsin Ave., Milwaukee 2, Wis. Special meetings held during year; annual meeting each spring at Madison, Wis.

X-Ray Study Club of San Francisco
Secretary, Dr. M. A. Sisson, 450 Sutter St., San Francisco, 8, Calif. Meets Jan. to July, Lane Hall, Stanford Univ. Hospital; July to Dec. San Francisco Hospital.

Cuba, Mexico and Central America

Sociedad de Radiología y Fisioterapia de Cuba
President, Dr. J. Manuel Viamonte, Hospital Mercedes, Habana, Cuba. Meets monthly in Habana.

Sociedad Mexicana de Radiologia y Fisioterapia
General Secretary, Dr. D. P. Cossio, Marsella No. 11, Mexico, D. F. Meets first Monday of each month.

Sociedad Radiológica Panameña
Secretary, Dr. L. Arrieta Sanchez, Apartado No. 86 Panama, R. de P. Meets monthly in a department of radiology of a local hospital, chosen at preceding meeting.

British Empire

British Institute of Radiology Incorporated with the Röntgen Society
Ordinary meeting, on the Thursday preceding the third Friday, October to May at 8:15 P.M.
Medical Members' meeting, on third Friday in each month at 5:00 P.M., 32 Welbeck St., London, W 1.

Faculty of Radiologists
Honorary Secretary, Dr. J. F. Bromley, 45, Lincoln's Inn Fields, London, W.C.2, England.

Section of Radiology of the Royal Society of Medicine (Confined to Medical Members)
Meets third Friday each month at 4:45 P.M. at the Royal Society of Medicine, 1 Wimpole St., London.

Canadian Association of Radiologists
Honorary Secretary-Treasurer, Dr. Jean Bouchard, Suite 305, 1555 Summerhill Avenue, Montreal 26, Que. Meetings January and June.

Section of Radiology, Canadian Medical Association
Secretary, Dr. C. M. Jones, Inglis St., Ext. Halifax, N. S.

Société Canadienne-Française d'Electrologie et de Radiologie Médicales
Secretary, Dr. Origéne Dufresne, 4120 Ontario St., East, Montreal, P. Q.

Australian and New Zealand Association of Radiologists
Honorary Secretary, Dr. Alan R. Colwell, 135 Macquarie St., Sydney, N.S.W.
Honorary Secretaries, State Branches:
New South Wales, Dr. E. W. Frecker, 135 Macquarie St., Sydney.
Victoria, Dr. T. L. Tyrer, 3 Lockerbie Court, East St. Kilda.
Queensland, Dr. J. Adam, 131 Wickham Terrace, Brisbane.
South Australia, Dr. R. de G. Burnard, 170 North Terrace, Adelaide.
Western Australia, Dr. A. M. Nelson, 179-B St. Georges Terrace, Perth.
New Zealand, Dr. E. G. Lynch, 12 Bolton St., Wellington.

South America

Asociacion Argentina de Radiologia
Secretary, Dr. Lidio G. Mocsa, Avda. Gral Paz 151, Córdoba, Argentina. Meetings held monthly.

Sociedad Argentina de Radiologia, Junta Central, Buenos Aires
Secretary, Dr. Oscar F. Noguera, Santa Fe 1171, Buenos Aires. Meetings are held monthly.

Sociedad Argentina de Radiologia, Filial del Litoral, Sede, Rosario
President, Dr. Francisco P. Cifarelli. Meets monthly second Wednesday, 19 ha 663 Italia St., Rosario, Santa Fe.

Sociedad Argentina de Radiologia, Filial del Sur, Sede, La Plata
President, Prof. Dr. Jose P. Uslenghi, La Plata. Meets monthly.

Sociedad Argentina de Radiologia, Filial del Centro, Sede, Cordoba
President, Prof. Dr. David L. Caro, Corro 86, Cordoba. Meets monthly.

Sociedad Argentina de Radiologia, Filial del Norte, Sede, Tucuman
President, Dr. Julio Mendez Valladares, Rivadavia 358, Tucuman. Meets monthly.

Sociedad Argentina de Radiologia, Filial de Cuyo Sede, Mendoza.
President, Dr. J. A. Orfila, Hospital Central, Mendoza. Meets monthly.

Sociedade Brasileira de Radiologia Medica
Secretary, Dr. Nicola Caminha, Av. Mem de Sa, Rio de Janeiro, Brazil. Meets monthly, except during January, February and March.

Sociedade Brasileira de Radioterapia
Secretary, Dr. Oscar Rocha von Pfuhl, Av. Brigadeiro Luiz Antonio, 644 São Paulo, Brazil. Meets monthly on second Wednesday at 9 P.M. in São Paulo at Av. Brigadeiro Luiz Antonio, 644.

Sociedad Colombiana de Radiologia
Secretary, Dr. Alberto Torres Focke, Av. 34, No. 17–34, Bogota, Colombia. Meets last Wednesday of each month.

Sociedad Peruana de Radiologia
Secretary, Dr. Julio Bedoya Paredes, Apartado, 2306, Lima, Peru. Meets monthly except during January, February and March, at Asociación Médica Peruana "Daniel A. Carrión," Villalta, 218, Lima.

Sociedad de Radiologica, Cancerologia y Fisica Medica del Uruguay
Secretary, Dr. Arias Bellini, Av. Agraciada 1464, Piso 13, Montevideo, Uruguay.

Continental Europe

Société Belge de Radiologie
General Secretary, Dr. S. Masy, 111 Avenue des Allies, Louvain, Belgium. Meets monthly, second Sunday at Maison des Médecins, Brussels.

Société Française d'Electro-Radiologie Médicale, and its branches: Société du Sud-Ouest, du Littoral Méditerranéen, du Centre et du Lyonnais, de l'Ouest, de l'Est, et d'Alger et d'Afrique du Nord
Secretary-General, Dr. A. Dariaux, 9 bis, Boulevard Rochechouart, Paris IX^{e}, France.

Ceskoslovenská společnost pro röntgenologii a radiologii v Prazb
Secretary, Dr. Roman Bláha, Praha XII, stát. nemocnice, Czechoslovakia. Meets monthly except during July, August, and September. Annual general meeting.

Polish Society of Radiology
Secretary, Dr. L. Zgliczynski, 59 Nowogrodzka St., Warsaw, Poland.

Gdansk Section, Polish Society of Radiology
Secretary, Dr. A. Smigielska, Akademia Lekarska, Gdansk. Meets monthly last Sunday at 10:30, X-Ray Dept., Akademia Gdansk.

Warsaw Section, Polish Society of Radiology
Secretary, Dr. L. Zgliczynski, 59 Nowogrodzka St., Warsaw, Poland. Meets monthly.

Societatea Romana de Radiologie si Electrologie
Secretary, Dr. Oscar Meller, Str. Banual Mărăcine, 30, S. I., Bucuresti, Roumania. Meets second Monday in every month with the exception of July and August.

All-Russian Roentgen Ray Association, Leningrad. USSR in the State Institute of Roentgenology and Radiology, 6 Roentgen St.
Secretaries, Drs. S. A. Reinberg and S. G. Simonson. Meets annually.

Scandinavian Roentgen Societies
The Scandinavian roentgen societies have formed a joint association called the Northern Association for Medical Radiology, meeting every second year in the different countries belonging to the Association.

Sociedad Espanola de Radiologia y Electrologia
Secretary, Dr. J. Martin-Crespo, Fuencarral, 7. Madrid, Spain. Meets monthly in Madrid.

Schweizerische Röntgen-Gesellschaft (Société Suisse de Radiologie)
Secretary, Dr. Max Hopf, Effingerstrasse 47, Bern, Switzerland.

Societa Italiana di Radiologia Medica
Secretary Prof. Mario Ponzio, Ospedale Mauriziano. Torino, Italy. Meets biannually.

India

Indian Radiological Association
Secretary, Dr. R. F. Sethna, Navsari Building, Hornby Road, Bombay 1, India

PRELIMINARY PROGRAM

FIFTY-SECOND ANNUAL MEETING OF THE AMERICAN ROENTGEN RAY SOCIETY

THE Fifty-second Annual Meeting of the American Roentgen Ray Society will be held at the Shoreham Hotel, Washington, D. C., September 25, 26, 27 and 28, 1951.

Attention is called in the Editorial to various features of the program and a detailed outline of the Instruction Courses is also given elsewhere in this issue.

The Golf Tournament will be held on Monday, September 24, with the annual Golf Dinner on Monday evening. On Tuesday evening, September 25, the Caldwell Lecture will be given by Dr. Wilder Penfield of Montreal, Canada. On Wednesday evening, September 26, open house will be held at the National Bureau of Standards. Thursday evening, September 27, has been reserved, as usual, for the Annual Banquet. For those who will come to the meeting who are interested in sight-seeing, Washington, of course, provides the ultimate in places of interest.

Again it is urged that hotel reservations be made as soon as possible through Mr. L. Gardner Moore, Manager, Shoreham Hotel, Washington, D. C.

The Scientific Program which has been arranged by President-Elect Kerr and his committee is as follows:

Tuesday, September 25, 1951

8:30 A.M. Instruction Courses.

10:00 A.M. Study of Scientific and Commercial Exhibits.

10:45 A.M. Call to Order, Fifty-second Annual Meeting, Bernard P. Widmann, M.D., President.

Address of Welcome: William B. Ballinger, M.D., President of the Medical Society of the District of Columbia.

Installation of the President-Elect, H. Dabney Kerr, M.D., Iowa City, Iowa, by President Widmann and the Chairman of the Executive Council, Paul A. Bishop, M.D., Philadelphia, Pa.

Inaugural Address: President H. Dabney Kerr, M.D.

11:15 A.M.

Paper No.

1. Effects of Total Body Irradiation. Brigadier General Elbert DeCoursey, Washington, D. C. (by invitation). Discussion by Brigadier General James P. Cooney, Washington, D. C. (by invitation).
2. An Analysis of the Hemorrhagic Aspects of Radiation Injury Produced by Exposure of the Whole Body to Penetrating Ionizing Radiation. E. P. Cronkite, M.D., Bethesda, Md. (by invitation). Discussion by Edwin G. Williams, M.D., Washington, D. C. (by invitation).
3. Activities of the American College of Radiology.

2:00 P.M.

4. Pubic and Ischial Necrosis Following Pelvic Operation (Otseitis Pubis). Edwin L. Lame, M.D. (by invitation), and Hon Chong Chang, M.D. (by invitation), Philadelphia, Pa. Discussion by Lloyd G. Lewis, M.D., Washington, D. C. (by invitation).
5. Transvaginal Cone Irradiation in Carcinoma of Cervix: Report of 13 Years' Experience. John Y. Howson, M.D., Wayne, Pa. (by invitation), Bernard P. Widmann, M.D., and James L. Weatherwax, M.Sc., Philadelphia, Pa. Discussion by Ralph M. Caulk, M.D., Washington, D. C.
6. Primary Malignant Tumors of the Nasopharynx. R. M. Geist, Jr., M.D. (by invitation), and U. V. Portmann, M.D., Cleveland, Ohio. Discussion by William E. Howes, M.D., Brooklyn, N. Y.
7. The Roentgen Manifestations of Unrecognized Skeletal Trauma in Infants. Frederic N. Silverman, M.D., Cincinnati, Ohio (by invitation). Discussion by Edward B. D. Neuhauser, M.D., Boston, Mass.

8. A Scintillation Counter for the Diagnosis and Localization of Intracranial Tumors. Michel Ter-Pogossian, M.S., Ph.D., William B. Ittner, III, M.S., William B. Seaman, M.D., and Henry G. Schwartz, M.D., St. Louis, Mo. (all by invitation). Discussion by Kenneth E. Corrigan, Ph.D., Detroit, Mich.

4:30 P.M. Executive Business Session of the Society.

Tuesday Evening, September 25, 1951

Eight-Thirty O'Clock
The Caldwell Lecture
Wilder Penfield, M.D.

Professor and Director of the Department of Neurology and Neurosurgery, McGill University, and Director of Montreal Neurological Institute, Montreal, P.Q., Canada.

"Cranial Clues to Abnormalities of Brain and Dura"

Introduction—Carleton B. Peirce, M.D., Montreal, Canada.

Wednesday, September 26, 1951

8:30 A.M. Instruction Courses.

10:00 A.M. Study of Scientific and Commercial Exhibits.

11:00 A.M.

Symposium arranged by Lauriston S. Taylor, Ph.D., Chief of Radiation Physics Laboratory, National Bureau of Standards, Washington, D. C.

9. Energy Response Characteristics of Radiation Dosage Meters. Frank H. Day, Washington, D. C. (by invitation).

10. The Use of Photographic Emulsions for Radiation Dosage Measurements. Margarete Ehrlich, Washington, D. C. (by invitation).

11. The Problem of Measuring Betatron Radiation. H. W. Koch, Washington, D. C. (by invitation). Discussion by G. Failla, Ph.D., New York, N. Y.

2:00 P.M.

Symposium arranged by Carleton B. Peirce, M.D., Montreal, Canada.

12. Some Observations on the Response of the Cells of the Central Nervous System. Jean Bouchard, M.D., Montreal, Canada. Discussion by Merrill C. Sosman, M.D., Boston, Mass.

13. Localized Thinning and Enlargement of the Cranium, with Special Reference to the Middle Fossa (a Sign of Expanding Intracranial Lesion). Arthur E. Childe, M.D., Winnipeg, Canada. Discussion by Carl List, M.D., Grand Rapids, Mich. (by invitation).

14. Congenital Abnormalities of the Craniovertebral Junction, and Associated Neurological Signs. D. L. McRae, M.D., Montreal, Canada (by invitation). Discussion by Carl List, M.D. Grand Rapids, Mich. (by invitation).

15. Agenesia of the Corpus Callosum and Concomitant Congenital Malformations. Eugene V. Van Epps, M.D., Iowa City, Iowa (by invitation). Discussion by Eugene P. Pendergrass, M.D., Philadelphia, Pa.

16. Cerebral Angiography—Fundamentals in Anatomy and Physiology. Philip J. Hodes, M.D., Francisco Campoy, M.D., Francisco Campoy, M.D. (by invitation), Helena E. Riggs, M.D. (by invitation), and Paul Bly, M.D. (by invitation), Philadelphia, Pa. Discussion by Fred J. Hodges, M.D., Ann Arbor, Mich.

17. Roentgenologic Recognition of Habenular Calcification as Distinct from Calcification in the Pineal Gland—Its Application in Cerebral Localization. Herbert M. Stauffer, M.D., Philadelphia, Pa. (by invitation). Discussion by Eugene P. Pendergrass, M.D., Philadelphia, Pa.

Thursday, September 27, 1951

8:30 A.M. Instruction Courses.

10:00 A.M. Study of Scientific and Commercial Exhibits.

11:00 A.M.

18. A General Theory of Bone Tumors. Lent C. Johnson, M.D., Washington, D. C. (by invitation). Discussion by T. Leucutia, M.D., Detroit, Mich.

19. Gross Osteopathology in Ancient Races—from the Present Day Viewpoint. William J. Tobin, M.D., Washington, D. C. (by invitation). Discussion by Merrill C. Sosman, M.D., Boston, Mass.

20. Bone Repair: The Pathology of Irradiation Fractures of the Femoral Neck and Aseptic Necrosis of the Femoral Head. Michael Bonfiglio, M.D., Iowa City, Iowa (by invitation). Discussion by Paul C. Hodges, M.D., Chicago, Ill.

2:00 P.M.

21. Million Volt Irradiation of Normal Tissues: Late Effects and Tolerance Doses. Milton Friedman, M.D., New York, N. Y. (by invitation), Lloyd G. Lewis, M.D. (by invitation), Aubrey O. Hampton, M.D., Irving B. Brick, M.D. (by invitation), Colonel Harold I. Amory, M.C., U.S.A. (by invitation), William N. Thomas, M.D. (by invitation), and William M. Leavenworth, M.D. (by invitation), Washington, D. C.
    A. Introduction. Lloyd G. Lewis, M.D
    B. Material and Methods of Examination. William N. Thomas, M.D.
    C. Effects on the Gastrointestinal Tract. Irving B. Brick, M.D.
    D. Effects on Spinal Cord, Kidney and Liver. Radiation Induced Sarcoma. Colonel Harold I. Amory, M.C., U.S.A.
    E. Tolerance Doses of Normal Tissues. Milton Friedman, M.D.
    Discussion by Hugh F. Hare, M.D., Boston, Mass.

22. Roentgen Therapy of Laryngeal and Hypopharyngeal Cancer. Ralph M. Caulk, M.D., Washington, D. C. Discussion by William Harris, M.D., New York, N. Y.

23. Roentgen Therapy through a Grid for Advanced Carcinoma. Jacob R. Fried, M.D., Ansel Lipman, M.D. (by invitation), and Lillian E. Jacobson (by invitation), New York, N. Y. Discussion by Hirsch Marks, M.D., New York, N. Y. (by invitation).

24. Dose Distribution in the Thorax during Multiple Field in Rotational Therapy. Joseph R. Nahon, M.D., Brooklyn, N. Y. (by invitation). Discussion by Edith H. Quimby, M.S., Sc.D., New York, N. Y.

4:30 P.M. Executive Business Session of the Society.

Thursday Evening, September 27, 1951

Seven-Thirty O'Clock
Annual Banquet

Presentation of Scientific Awards
(1950 and 1951)

Friday, September 28, 1951

8:30 A.M. Instruction Courses.

10:00 A.M. Study of Scientific and Commercial Exhibits.

11:00 A.M.

25. The Use of Filters to Control Radiation Exposure to the Patient in Diagnostic Roentgenology. E. Dale Trout, John P. Kelley, and George A. Cathey, Milwaukee, Wis. (all by invitation). Discussion by Frederick O. Coe, M.D., Washington, D. C.

26. Calorimetric Determination of the Roentgen. John S. Laughlin, Ph.D. (by invitation), and Roger A. Harvey, M.D. (by invitation), Chicago, Ill. Discussion by Lauriston S. Taylor, Ph.D., Washington, D. C.

27. The Production of X-Ray Motion Pictures with the Johns Hopkins Screen Intensifier. Russell H. Morgan, M.D., Baltimore, Md. Discussion by Paul C. Hodges, M.D., Chicago, Ill.

2:00 P.M.

28. Roentgen Demonstration and Significance of the Pedicle in Polypoid Tumors of the Alimentary Tract. Barton R. Young, M.D., and Robert L. Scanlan, M.D. (by invitation), Philadelphia, Pa. Discussion by Clyde A. Stevenson, M.D., Temple, Texas.

29. The Duodenum in Carcinoma of the Pancreas. John W. Beeler, M.D., Indianapolis, Ind. (by invitation), and B. R. Kirklin, M.D., Rochester, Minn. Discussion by James T. Case, M.D., Chicago, Ill.

30. Visualization of the Common Duct during Cholecystography—Its Significance. Maurice D. Sachs, M.D., Cleveland, Ohio (by invitation). Discussion by Paul C. Swenson, M.D., Philadelphia, Pa.

31. Roentgen Diagnosis of Bleeding Lesions in the Small Intestine. Andrew P. Dedick, M.D. (by invitation), and

Lois Cowan Collins, M.D. (by invitation), New York, N. Y. Discussion by Fred J. Hodges, M.D., Ann Arbor, Mich.

32. Photofluorographic Examination for Gastric Neoplasms in Asymptomatic Patients. Russell Wigh, M.D. (by invitation), and Paul C. Swenson, M.D., Philadelphia, Pa. Discussion by Russell H. Morgan, M.D., Baltimore, Md.

33. Chronic Ulcerative Granulomatous Ileojejunitis. Richard H. Marshak, M.D. (by invitation), and Bernard S. Wolf, M.D., New York, N. Y. Discussion by Aubrey O. Hampton, M.D., Washington, D. C.

AMERICAN ROENTGEN RAY SOCIETY

SECTION ON INSTRUCTION

Harry M. Weber, M.D., *Director*

Titles and Abstracts of Courses Offered

Fifty-Second Annual Meeting

Shoreham Hotel, Washington, D. C.

September 25–28, 1951

PRESIDENT-ELECT H. Dabney Kerr, with the approval of the Executive Council, has directed that the Section on Instruction be continued for the annual meeting of 1951. His program has been arranged so that the Instruction Courses will be offered between the hours of 8:30 A.M. and 10:00 A.M. on Tuesday, Wednesday, Thursday and Friday.

Thirteen rooms have been made available for the purposes of the Section on Instruction. Courses will be presented in each one of these rooms every day of the meeting. A total of 90 minutes has been made available for each course. This makes it possible for instructors to devote ample time to discussion and to conference with those attending the courses. No other official activity has been scheduled for this time.

The Section on Instruction presents for 1951:

(1) Four courses (Courses 101, 102, 103, 104), one each day, on miscellaneous subjects of interest to radiologists, with a faculty of four instructors and covering four periods.

(2) Four courses (Courses 201, 202, 203, 204), one each day, dealing largely with Radiologic Physics, with a faculty of five instructors and covering four periods.

(3) Ten single period courses in Therapeutic Radiology (Courses 301 to 310), with a faculty of nine instructors and covering ten periods.

(4) Twenty-two single period courses and five multiple period courses in Diagnostic Roentgenology (Courses 401 to 434), with a faculty of thirty instructors and covering thirty-four periods.

GENERAL INFORMATION

The Faculty

J. Robert Andrews, M.D., Professor of Radiology, Bowman Gray School of Medicine, and Director of Radiology, North Carolina Baptist Hospitals, Inc., Winston-Salem, North Carolina.

W. E. Baensch, M.D., Professor of Radiology, Georgetown University School of Medicine, Washington, D.C.; Head of the Departments of Radiology at Georgetown University Hospital, Washington, D.C., and Arlington Hospital, Arlington, Virgina; Senior Consultant, Veterans Administration, Washington, D. C.

Fred O. Coe, B.S., M.D., D.Sc., Partner in the firm of Drs. Groover, Christie and Merritt, Washington, D.C.; Radiologist to Doctors Hospital, Washington, D. C.

Lois Cowan Collins, M.D., Associate Professor of Radiology, College of Physicians and Surgeons, Columbia University; Assistant Radiologist, Presbyterian Hospital, New York, New York.

Robert N. Cooley, M.D., Associate Professor, Department of Radiology, Johns Hopkins Hospital, Baltimore, Maryland.

George Cooper, Jr., M.D., Associate Professor of Roentgenology, Department of Medicine, University of Virginia, Charlottesville, Virginia.

K. E. Corrigan, Ph.D., Director, Radiological Research Department, Harper Hospital; Associate Professor, Wayne University, Detroit, Michigan.

Alfred A. J. Den, B.S., M.D., Head and Director of the Department of Radiology, Episcopal Eye, Ear and Throat Hospital, Washington, D .C.

Juan A. del Regato, M.D., Assistant Professor of Radiology, University of Colorado Medical School; Director, Penrose Cancer Hospital, Colorado Springs, Colorado.

S. W. Donaldson, M.D., Director, Professional Bureau, American College of Radiology; Radiolo-

gist, St. Joseph Mercy Hospital, Ann Arbor, Michigan.

Jesse E. Edwards, M.D., Consultant, Section on Pathologic Anatomy, Mayo Clinic, Rochester, Minnesota; Assistant Professor of Pathologic Anatomy, Mayo Foundation, University of Minnesota, Minneapolis, Minnesota.

Titus C. Evans, Ph.D., Research Professor of Radiology and Radiobiology, Head, Radiation Research Laboratory, College of Medicine, State University of Iowa, Iowa City, Iowa.

William R. Eyler, M.D., Associate Radiologist, Massachusetts General Hospital, Boston; Instructor in Radiology, Medical School, Harvard University, Boston, Massachusetts.

Ross Golden, M.D., Professor of Radiology, College of Physicians and Surgeons, Columbia University; Director of the Radiological Service, Presbyterian Hospital, New York, New York.

David M. Gould, M.D., Associate Professor, Department of Radiology, Johns Hopkins Hospital, Baltimore, Maryland.

Rolfe M. Harvey, M.D., Associate Director of the Department of Radiology, Bryn Mawr Hospital, Bryn Mawr, Pennsylvania; Assistant Roentgenologist of the Children's Hospital, Philadelphia, Pennsylvania; Associate in Radiology at the Graduate School of Medicine, University of Pennsylvania and Guest Lecturer in Pediatric Roentgenology, School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.

Theodore F. Hilbish, M.D., Senior Surgeon, Tuberculosis Control Division, United States Public Health Service, Washington, D .C.

Fred J. Hodges, M.D., Professor of Roentgenology, University of Michigan, Ann Arbor, Michigan.

John F. Holt, M.D., Associate Professor of Roentgenology, University of Michigan, Ann Arbor, Michigan.

Howard B. Hunt, M.D., Professor of Radiology and Chairman of Radioisotope Program, University of Nebraska, College of Medicine, Omaha, Nebraska.

Harold W. Jacox, M.D., Professor of Radiology, College of Physicians and Surgeons, Columbia University; Chief of Radiotherapy Division of Radiological Service, Presbyterian Hospital, New York, New York.

Lent C. Johnson, M.D., Chief, Orthopedic Pathology, Armed Forces Institute of Pathology, Washington, D. C.

Roy W. Johnson, M.D., Radiologist, Los Angeles Tumor Institute; Assistant Professor of Radiology, College of Medical Evangelists, Los Angeles, California.

John H. Juhl, M.D., Assistant Professor of Radiology, University of Wisconsin Medical School, Madison, Wisconsin.

Isadore Lampe, M.D., Ph.D., Associate Professor of Roentgenology, University of Michigan, Ann Arbor, Michigan.

I. Lattman, Radiologist to Children's Hospital and National Homeopathic Hospital, Washington, D. C.; Visiting Radiologist to Gallinger Municipal Hospital and Associate Professor of Radiology, Georgetown University School of Medicine, Washington, D. C.

E. T. Leddy, M.D., Associate Professor of Radiology, Mayo Foundation, University of Minnesota, Minneapolis, Minnesota; Head of Section on Therapeutic Radiology, Mayo Clinic, Rochester, Minnesota.

George Levene, M.D., Professor of Radiology, Boston University School of Medicine; Chief, Radiology Service, Massachusetts Memorial Hospitals, Boston, Massachusetts.

A. S. Macmillan, M.D., Radiologist, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts.

Charles L. Martin, M.D., Professor of Radiology, Southwestern Medical College, Dallas, Texas.

Russell H. Morgan, M.D., Professor, Department of Radiology, Johns Hopkins Hospital, Baltimore, Maryland.

Edward B. D. Neuhauser, M.D., Associate in Radiology, Harvard Medical School, Boston, Massachusetts; Radiologist to The Infant's and to The Children's Hospitals of Boston.

H. M. Parker, M.A., Ph.D., Manager of Health Instrument Divisions, General Electric Company Nucleonics Department, Richland, Washington.

Lester W. Paul, M.D., Professor of Radiology, University of Wisconsin Medical School, Madison, Wisconsin.

Gerald M. Peterson, Clinical Instructor of Radiology, University of Louisville, School of Medicine, Louisville, Kentucky.

Harold O. Peterson, M.D., Clinical Associate Professor of Radiology, University of Minnesota, Minneapolis, Minnesota; Radiologist to Miller Hospital and Children's Hospital, St. Paul, Minnesota.

Everett L. Pirkey, M.D., Professor, Department of Radiology, University of Louisville School of Medicine; Director, Department of Radiology,

Louisville General Hospital; Radiologist, Kosair Crippled Children Hospital, Louisville, Kentucky.

Ignacio V. Ponseti, Assistant Professor, Department of Orthopedic Surgery, State University of Iowa, Iowa City, Iowa.

U. V. Portmann, M.D., Director of Therapeutic Radiology, Cleveland Clinic Foundation, Cleveland, Ohio.

Laurence L. Robbins, M.D., Radiologist-in-Chief, Massachusetts General Hospital, Boston; Assistant Professor, Medical School, Harvard University, Boston, Massachusetts.

E. Graeme Robertson, M.D. (Melb.)., F.R.C.P., F.R.A.C.P., Honorary Neurologist, Royal Melbourne Hospital and Children's Hospitals, Melbourne, Victoria, Australia.

William W. Stanbro, M.D., Professor of Radiology, George Washington University, Washington, D. C.; Executive Officer, Department of Radiology, George Washington University Hospital, Washington, D. C.

Clyde A. Stevenson, M.D., Head of the Department of Radiology, Scott & White Clinic, Temple, Texas; Professor of Radiology, University of Texas Post-graduate School.

Ralph E. Sturm, Physicist, Department of Radiology, Johns Hopkins Hospital, Baltimore, Maryland.

Paul C. Swenson, M.D., Professor of Radiology, Jefferson Medical College, Philadelphia, Pennsylvania.

Edwin G. Williams, M.D., Consultant, Atomic Medicine, Health and Special Weapons Defense Division; Office of Health and Welfare, Federal Civil Defense Administration, Washington, D. C.

Colonel William L. Wilson, M.C., U.S.A., Assistant Administrator, Health and Welfare Office, Federal Civil Defense Administration, Washington, D. C.

Ernest H. Wood, M.D., Associate Professor of Radiology, College of Physicians and Surgeons, Columbia University; Attending Radiologist, Neurological Institute, New York, New York.

Conference Periods

Tuesday, Wednesday, Thursday and Friday mornings.
Single Periods.....8:30–10:00 A.M.

Location

All courses will be given in Rooms 109F, 110F, 111F, 112F, 113F, 114F, 115F, 116F, 117F, 118F, 119F, 120F, 121F, 122F, which are located on the First Floor of the Shoreham Hotel, in F Wing, off the West Lobby. Full information will be obtainable at the registration desk of the Section on Instruction which will be found in the West Lobby near the entrance to F Wing. Attendants will be at this desk from 1 P.M. to 5 P.M. on Sunday, September 23; on Monday, September 24, from 8:30 A.M. until 4:30 P.M.; and on the remaining days of the meeting from 8:00 A.M. until 4:30 P.M.

Code

The instruction periods will be designated with the following code:

T, Tuesday.....8:30–10:00 A.M.
W, Wednesday.....8:30–10:00 A.M.
Th, Thursday.....8:30–10:00 A.M.
F, Friday.....8:30–10:00 A.M.

How to Register and Obtain Tickets for the Instruction Courses

Admission to the Instruction Courses will be by ticket only.

Following the list of titles and abstracts is a *general order sheet.* First, second, and third choices for each period should be selected carefully and indicated on the order sheet. The rooms in which the courses will be given are moderately large ones, but it will be necessary to place a limitation on the number of persons who will be able to attend individual courses. It is estimated that the number who can attend will range between 50 and 60 persons. If the directions given on the order sheet are followed explicitly, errors in completing reservations for the courses will be minimized.

It is possible for one to attend only four periods of instruction, so the condensed schedule given on the last pages of this program should be consulted with care when registering and ordering tickets for the courses.

Reservations for the courses will be made in the order in which the order forms are received. Those who are not members of the American Roentgen Ray Society will be charged the nominal fee of $1.50 per period of instruction, or a maximum fee of $5.00 for four periods. Full-time graduate students in radiology will be admitted

without fee, but they will be required to make application for the courses they wish to attend.

Previous to September 10, 1951, the order forms should be sent to the Director, Dr. Harry M. Weber, Mayo Clinic, Rochester, Minnesota. After September 10, 1951, the orders should be sent directly to Dr. Harry M. Weber, Shoreham Hotel, Washington, D. C.

To avoid the confusion always existing on the first days of the meeting, a set of tickets will be mailed to each person whose registration for courses reaches the office of the Director on or before September 10, 1951. The envelope containing the tickets will be labelled in a conspicuous manner. Registrants are urged to be on the lookout for their tickets, and to bring them to the meeting. The success of this plan depends entirely on the cooperation of the registrants.

In case the courses are not filled by the time of the meeting, tickets will be available at the registration desk of the Section on Instruction on Sunday, September 23, and thereafter during the meeting.

Holders of Tickets

Those who do not have the proper ticket for the course they wish to attend will not be permitted to enter the room. An attendant will be at the door of each conference room to collect the tickets.

DESCRIPTION OF COURSES

COURSE 101

Room 111 F **Period: T**

S. W. DONALDSON, M.D.,
Ann Arbor, Michigan

Practice of Radiology in the United States—Facts and Figures

Comment will be made from lantern slides showing the distribution of radiologists in the United States according to population, geography and the ratio of radiologists to other physicians and specialists; various hospital financial arrangements; ownership of roentgen-ray equipment by physicians other than radiologists; relationship between hospital admissions and roentgenographic examinations; average film consumption; distribution of roentgenographic examinations by conditions; ratio between diagnostic and therapy patients; costs of radiology as related to hospital and medical services; and radiology and prepayment medical care plans.

Part of the discussion will be devoted to hospital department of radiology planning, equipping, staffing and cost accounting. A formula for determining personnel, space and equipment investment requirements will be given.

COURSE 102

Room 110 F **Period: Th**

JESSE E. EDWARDS, M.D.,
Rochester, Minnesota

Pathologic Features Associated with Dilatation of the Major Pulmonary Arteries

This will be an analysis of the conditions associated with dilatation of the major pulmonary arteries. In general, four categories of conditions are associated with this change. One is characterized by pulmonary hypertension associated with impaired venous return from the lungs. A second condition is that associated with pulmonary hypertension related to intrinsic disease of the lungs. A third condition is characterized by excess pulmonary blood flow with or without associated pulmonary hypertension. A fourth condition represents a group of congenital malformations in which there is a common ventricular ejectal force for both the pulmonary and the systemic circulations in the absence of pulmonary stenosis.

The course will present the nature of the underlying lesions and the cardiac and pulmonary changes associated with the various types of cases in which the major pulmonary arteries are dilated.

COURSE 103

Room 110 F **Period: F**

JESSE E. EDWARDS, M.D.,
Rochester, Minnesota

Congenital Diseases of the Aorta

In regard to coarctation of the aorta, this course will present the pathologic basis for coarctation, the associated secondary features including details as to the collateral circulation and complications of the disease. The subject of vascular rings will primarily cover the anatomic variations in the anomalous patterns in the aortic arch leading to vascular rings which in turn may cause interference with the function of the trachea and the esophagus.

COURSE 104

Room 122 F **Period: T**

COLONEL WILLIAM L. WILSON, M.C., U.S.A.,
EDWIN G. WILLIAMS, M.D.,
Washington, D. C.

The Role of the Radiologist in Atomic Warfare

This discussion will consist of the broader aspects

of organization and the responsibilities of medicine in general.

This lecture will pertain more directly to the specific responsibilities and duties of the radiologist in the event of atomic warfare.

It is recognized that the radiologist is peculiarly equipped to deal with radiologic warfare, but since most of his experience has been with controlled or self-contained radiation, more information is needed on disseminated radioactive particles, and this course is also designed to present such information as is necessary.

COURSE 201

Room 114 F **Period: F**

J. ROBERT ANDREWS, M.D.,
Winston-Salem, North Carolina

Concepts of Biological Dose and Aspects of the Time Factor

The concept of a biological dose, that is the optimal correlation of the quantity and quality of radiation and the time in which the radiation is given in respect to the radiosensitivity of normal and neoplastic tissues, will be developed. Quantity of radiation will be considered in terms of energy absorption and quality of radiation will be considered in terms of linear ion density and in relation to quantity. The concept of an optimal dose-time relationship will be developed and the derivation of the time factor for the cure of squamous cell carcinoma will be discussed. The practical applications of the concept of biological dose and the time factor will be considered. Throughout the course the emphasis will be upon the biological, rather than upon the physical, aspects of radiation therapy.

COURSE 202

Room 114 F **Period: W**

TITUS C. EVANS, Ph.D.,
Iowa City, Iowa

Biophysical and Biochemical Effects of Ionizing Radiations

The differences between the interaction of material with ionizing and with non-ionizing radiation will be discussed briefly.

Our present concept of the mechanism whereby the energy in a roentgen-ray beam is transferred to tissue so as to produce first physical, then chemical, and finally biologic changes will be discussed.

Mention will be made of the various theories of biologic action which attempt to stress the relative importance of the various processes whereby the radiation energy has been absorbed.

There will be a brief discussion of variation in and modification of radiosensitivity. The factors of radiation intensity and radiation wavelengths will be discussed as regards their biologic effectiveness.

COURSE 203

Room 114 F **Period: Th**

RUSSELL H. MORGAN, M.D.,
RALPH E. STURM, Physicist,
Baltimore, Maryland

The Place of Electronics in Roentgenology

The rapid development of the field of electronics has reflected itself in an ever increasing application of electronic methods to the science of radiology. The basic principles which are involved in many of these electronic applications will be discussed in detail. The course will include material on a variety of practical electronic instruments that are finding an increasing use in radiology. These include scintillation counters, Geiger-Müller counters, the electronic components of the various screen intensification systems and the electronic components of such diagnostic apparatus as automatic phototimers and electronic timers.

COURSE 204

Room 114 F **Period: T**

H. M. PARKER, M.A., Ph.D.,
Richland, Washington

Radiation Dosimetry

1. Roentgen rays and gamma rays:
   Advantages of an ionization method.
   Interpretation of the original definition of the "roentgen."
   Energey absorption and the Bragg-Gray Principle.
   Interpretation of the current definition of the "roentgen."
   The gamma-roentgen.
   Complexities with multimillion volt radiation.
2. Other radiations:
   Extension of the roentgen to particulate radiations.
   Gray's Energy Unit.
   The "rep."
   Applications to radioisotope therapy and neutron therapy.
   Other proposals for physical dose units.
3. Factors of biological effectiveness:
   Relative biological effectiveness.
   The "rem."
   Scale of relation between "rep" and "rem."
   Severe limitations of the "rem."

COURSE 301

Room 117 F **Period: T**

J. A. del REGATO, M.D.,
Colorado Springs, Colorado

Treatment of Cancer of the Skin

Malignant melanomas of the skin, or any lesion suspected of being a malignant melanoma, should be treated surgically, and preferably not by means that would destroy the specimen and interfere with its proper histopathologic study.

Basal cell carcinoma and epidermoid carcinoma of the skin may be treated successfully both by surgery and by radiation therapy, but the possibilities of success extend further in the case of radiation therapy, and the chances of a better cosmetic result are greater by this means. In the choice of treatment, several factors are involved, such as location, invasiveness and extent of the tumor.

Radium can be applied successfully to the treatment of skin carcinomas, but roentgen therapy is considerably more applicable to the necessities of the case, and may produce better results.

COURSE 302

Room 117 F **Period: W**

J. A. del REGATO, M.D.,
Colorado Springs, Colorado

Indications for Treatment of Cancer of the Larynx

There is considerable difficulty in appraising results of treatment of cancer of the larynx. This stems, for the most part, from unequal use of words, different segregation of patients, unequal experience with the different types of treatments, and unequal reporting of results.

There are instances in the treatment of cancer of the larynx, where radical roentgen therapy offers the only possibility of success. There are others, in which, in spite of the limited size of the lesion, roentgen therapy seldom succeeds and a total laryngectomy is preferable. In some instances, adequate roentgen therapy may be tried as a first step; if the treatment is correctly administered, it should not interfere with subsequent total laryngectomy.

COURSE 303

Room 113 F **Period: Th**

HOWARD B. HUNT, M.A., M.D.,
Omaha, Nebraska

Radioiodine in Thyroid Disease—Clinical and Radiological Aspects

Consideration will be given primarily to clinical evaluation of patients with thyrotoxicosis, thyroiditis and carcinoma of thyroid, their treatment by radioiodine and roentgen rays and their clinical management.

COURSE 304

Room 119 F **Period: W**

HAROLD W. JACOX, M.D.,
New York, New York

The Place and Technique of Radiation Therapy in Cancer of the Breast

Fundamental considerations involving present day position of radiation therapy will be presented. The histopathologic changes in breast tumors produced by irradiation will be discussed. The relationship between radiation therapy and hormone administration will receive attention. The selection of the type of case and technique of roentgen therapy will be detailed. Time will be allowed for questions and answers.

COURSE 305

Room 118 F **Period: W**

ISADORE LAMPE, M.D.,
Ann Arbor, Michigan

Radiation Therapy of Selected Non-Malignant Conditions

A discussion will be given of clinical indications, value and techniques of radiation therapy in the following conditions:

Simple inflammations and infections
Acute parotitis
Acute postpartum mastitis
Tuberculous lymphadenitis
Rheumatoid spondylitis
Myasthenia gravis
"The thymus"

COURSE 306

Room 118 F **Period: F**

EUGENE T. LEDDY, M.D.,
Rochester, Minnesota

Roentgen Therapy for Malignant Tumors of the Testis

The roentgen therapeutic value of pathologic classifications of testicular tumors, of hormonal assays, and various methods of differential diagnosis will be assessed. The status of preoperative radiotherapy and of biopsy will be appraised. The treatment now given to these tumors at the Mayo Clinic will be discussed in detail, and, provided suitable data are available then, a full statistical analysis of results will be presented.

COURSE 307

Room 116 F **Period: Th**

CHARLES L. MARTIN, M.D.,
Dallas, Texas

Cancer of the Face, Mouth and Neck Treated with Irradiation Alone

All carcinomas of the face and mouth, regardless of their size, are treated with either roentgen therapy or low intensity radium needles. In many instances electrosurgery is used as a preliminary procedure to reduce the tumor to a flat plane or to remove involved cartilage. Metastatic lymph nodes in the neck are treated by a combination of roentgen therapy and low intensity radium needles. Details of technique, illustrative cases and statistical results will be presented with the aid of lantern slides.

COURSE 308

Room 118 F **Period: T**

ROY W. JOHNSON, M.D.,
Los Angeles, California

Radiation Therapy of Vascular Nevi

Vascular nevi which are treated successfully by radiation therapy are: (1) hemangioma simplex (strawberry mark); (2) cavernous hemangioma; (3) lymphangioma. The use of radium and roentgen rays in the treatment of these lesions will be discussed and various techniques and their end results illustrated. Advantages and disadvantages of irradiation will be pointed out.

COURSE 309

Room 119 F **Period: F**

U. V. PORTMANN, M.D.,
Cleveland, Ohio

Contact Roentgen Therapy for Superficial Lesions

This will be a presentation with Kodachrome slides of cases of epitheliomas, hemangiomas, verruca and similar conditions given contact roentgen therapy. Results will be shown and techniques used for treatment will be described. Some of the difficulties and contraindications of this method will be discussed.

COURSE 310

Room 116 F **Period: F**

ERNEST H. WOOD, M.D.,
New York, New York

Radiation Treatment of Primary Tumors of the Brain and Spinal Cord

The majority of primary tumors of the central nervous system are treated by surgery followed by irradiation. Some neoplasms are managed best by roentgen therapy alone. Factors which affect the selection of cases for irradiation are the position of the lesion in relation to important nerve centers and tracts, the histopathological nature and biological activity of the tumor and the general condition of the patient. An attempt will be made to correlate the neurosurgical and radiological viewpoints of treatment.

Highlights of the pathological and clinical aspects of brain and spinal cord tumors, which are of interest to radiologists, will be given. Emphasis will be placed upon handy methods of accurately applying fields of radiation. Standard techniques of treatment and tumor dosage employed at the Neurological Institute of New York will be discussed. Difficult problems, which arise because of tumor extension and recurrence, will be illustrated by case reports.

COURSE 401

Room 112 F **Period: F**

W. E. BAENSCH, M.D.,
Washington, D. C.

The Interpretation of Changes in the Relief Pattern of the Mucous Membrane of the Alimentary Canal in Precancerosis

A survey will be given of:

1. Lesions of the esophagus and their differential diagnosis from malignancies.
2. Pathology of precancerosis in the stomach (ulcers, chronic gastritis, polyps, syphilis, and others) and malignant degeneration.
3. Precancerous lesions of the colon with malignant degeneration.
4. Moving picture on the normal physiology of the colon and the pathological physiology in cancer of the colon.

COURSE 402

Room 112 F **Period: T**

FRED O. COE, M.D.,
Washington, D. C.

Diagnostic Urography

Part I

A. This will be devoted to demonstration of normal urography with some of the many congenital and acquired variations.

B. Calculi of the urinary tract with emphasis on the difficulties of diagnosis.

C. Traumatic lesions of the urinary tract.

D. Cysto-urethrography.

COURSE 403

Room 112 F **Period: W**

FRED O. COE, M.D.,
Washington, D. C.

Diagnostic Urography

Part II

A. Inflammatory diseases of the urinary tract due to non-tuberculous and tuberculous disease, pyeloureteritis, cystitis and urethritis will be demonstrated.

B. Tumors and cystic disease of the kidneys will be discussed as far as time will permit.

COURSE 404

Room 119 F **Period: T**

ROBERT N. COOLEY, M.D.,
Baltimore, Maryland

The Roentgen Diagnosis of Congenital Cardiovascular Anomalies

The approach of the roentgenologist to the diagnosis of congenital cardiovascular anomalies will be discussed.

The findings derived from conventional roentgen studies of most of the common anomalies will be presented. These will include the following: patent ductus arteriosus, coarctation of the aorta, interatrial and interventricular septal defects, tricuspid stenosis or atresia and transposition of the great vessels. Emphasis will be placed on the information which will be of the most importance in the selection of patients for surgical treatment.

A short period will be devoted to a discussion of the indications for and technique of special procedures such as angiocardiography, aortography and cardiac catheterization.

COURSE 405

Room 120 F **Period: T**

GEORGE COOPER, JR., M.D.,
Charlottesville, Virginia

Some Limitations of Roentgen Diagnosis

Most material presented at meetings and in journals emphasizes the increasing accuracy of roentgen diagnosis. Roentgenologists are apt to develop an exaggerated idea of their own reliability. Non-roentgenologists are apt either to accept too readily the roentgenologist's opinion or to demand a more exact diagnosis than the roentgen findings justify.

Roentgenologists should be as fully aware of their limitations as of their capabilities. To this end, interpretations of the initial chest roentgenograms in patients with bronchogenic carcinoma, seen at a teaching hospital during the past ten years, will be analyzed.

COURSE 406

Room 113 F **Period: F**

K. E. CORRIGAN, Ph.D.,
Detroit, Michigan

Diagnostic Use of Radioisotope Tracers

The course will cover the use of radioiodine (I^{131}) for the differential diagnosis of thyroid diseases. Specific attention will be paid to the tracer pattern of concealed toxic adenomas and concealed obstructive lesions of the thyroid, the differentiation of unidentifiable mediastinal shadows seen in the roentgenogram and the detection of peritracheal metastases which do not appear on the film. The differentiation of malignant from non-malignant thyroid disease will be covered in detail. The use of other isotope tracers, such as radiophosphorus (P^{32}) as a second tracer in intrathoracic lesions and for the localization of bone and brain lesions, either primary or metastatic, will be considered. The physical factors and the technology necessary for the performance of these tracer studies will form the basis for the course, which will be illustrated with specific examples and statistical results.

COURSE 407

Room 115 F **Period: T**

ALFRED A. J. DEN, M.D.,
Washington, D. C.

The Precise Roentgen Localization of Foreign Bodies in the Eye

This course will be a discussion and illustration of methods used for detection of ocular foreign bodies and the technique of examination for precise roentgen localization, with emphasis on those methods adaptable to modern shock-proof roentgen-ray equipment. Comparison of accuracy, advantages and disadvantages and sources of errors. Confirmed findings in over 300 cases will be presented.

COURSE 408

Room 120 F **Period: Th**

ROSS GOLDEN, M.D.,
LOIS C. COLLINS, M.D.,
New York, New York

The Small Intestine

Anatomy
Physiology
- Movements of tunica muscularis
- Movements of the muscularis mucosae
- Electromyograms

Nervous control of the intestine
  Parasympathetic
  Sympathetic
  Chemical Mediators
    Acetylcholine
    Adrenin
  Transmission of nerve impulse
Roentgen examination of the small intestine
  Radiopaque preparations
  Six manifestations of intestinal motor function
  Clinical indications for roentgen-ray study
Disorders consistent with parasympathetic overactivity
  Psychosomatic effects
  Functional intussusception
  Allergy
Parasympathetic inhibition (banthine)
Parasympathomimetic drugs
Sprue syndrome
Disorders consistent with sympathetic overactivity
Potassium deficit and paralytic ileus
Localized disorders of motor function
  Spasm of the efferent loop of jejunum following partial gastric resection
  Effect of peritoneal adhesions
  Effect of diseases of the mesentery

COURSE 409

Room 115 F **Period: W**

DAVID M. GOULD, M.D.,
Baltimore, Maryland

Accuracy of Interpretation of Chest Roentgenograms

A discussion will be held on the accuracy of chest film interpretation. This problem has been of great interest during the past ten years as a result of wide differences of opinion concerning the accuracy of mass survey photofluorography.

Particular emphasis will be placed on false negative and false positive films. If time permits, the derivation of a series of films for training and testing purposes will be discussed.

The audience will have the opportunity to interpret twenty-four proved cases of tuberculosis found in mass roentgen surveys. Some difficult cases will be shown interpreted with essentially negative films.

COURSE 410

Room 119 F **Period: Th**

ROLFE M. HARVEY, M.D.,
Bryn Mawr, Pennsylvania

Skeletal Changes in Diseases of Infants and Children

The course will consist in presentation of the characteristic roentgen changes found in the bones of infants and children, selected from the following conditions:

Congenital syphilis
Rickets
Scurvy
Tuberculosis
Metallic poisons
Blood dyscrasias
Lipoid dystrophies
Chondrodystrophies
Osteogenesis imperfecta
Hypervitaminoses

As far as possible in the time allotted, the characteristic changes, as well as the differential diagnosis will be considered in each disease entity.

COURSE 411

Room 117 F **Period: F**

THEODORE F. HILBISH, M.D.,
Washington, D. C.

Cardiovascular Measurements

The significance of cardiac mensuration in the evaluation of the clinical status of patients with heart disease will be discussed. The ranges of normal for the various cardiac dimensions will be presented and the relationship of these measurements to a wide variety of pathological conditions will be reviewed. An analysis of the various methods of correlating cardiac measurements with such factors as the height and weight of the patient and the transverse diameter of the thorax will also be given. This analysis will demonstrate the general ineffectiveness of these correlations in routine clinical measurements of the heart.

COURSE 412

Room 113 F **Period: T**

FRED J. HODGES, M.D.,
JOHN F. HOLT, M.D.,
Ann Arbor, Michigan

Routine Photofluorography of the Chest—Analysis of 10 Years' Experience

The over-all results of mass roentgenography of the chest applied routinely on registration are presented covering an entire decade. Technical, administrative and medical problems are reviewed. Approached from the viewpoint of positive photofluorographic findings, end results are analyzed and evaluated.

COURSE 413

Room 111 F **Period: W**

LENT C. JOHNSON, M.D.,
Washington, D. C.

The General Biology of Bone Tumors

The general principles of neoplasia and the position of neoplasia in biology will be presented in a brief introduction. This will be followed by a detailed exposition of both the characteristic and atypical features of the ten major malignant and potentially malignant bone tumors, namely: Ewing tumor, myeloma, reticulum cell sarcoma, fibrosarcoma, chondrosarcoma, osteosarcoma, epiphyseal chondroblastoma, parosteal osteoma, giant cell tumor and osteolytic bone sarcoma. Particular emphasis will be placed on atypical patterns and the variable and overlapping patterns.

The interrelationships of the various types of cells in bone and cartilage will be outlined and the function of these cells interpreted in terms of protein chemistry; the varying patterns of the bone tumors will be directly correlated with this background.

The local metabolic and functional differences within a single bone will then be discussed and the characteristics of individual tumors related directly to these aspects of local behavior.

The variations in metabolism between different bones of the skeleton will be presented and the modifications of each of the tumors, as it appears in different parts of the skeleton, correlated with these metabolic factors.

An attempt will be made to show how the interrelationships of the variable histopathologic patterns of each of the major bone tumors, when correlated with the protein physiology, function in different portions of the same bone, and metabolic gradients of the entire skeleton suggest a general theory of bone tumors.

COURSE 414

Room 116 F **Period: T**

I. LATTMAN, M.D.,
Washington, D. C.

Epiphysitis in Infants and Children

Modern concepts of the disease; theories of etiology; pathology; roentgenologic diagnosis; treatment; prognosis.

Lantern slides and roentgenograms will be used for illustration.

COURSE 415

Room 116 F **Period: W**

I. LATTMAN, M.D.,
Washington, D. C.

Some Diseases Causing Skeletal Changes in Infants and Children

1. Reticuloendotheliosis.
2. Epidermoidomas.
3. Caffey-Smythe syndrome or cortical hyperostosis.

Modern concepts of the diseases; theories of etiology; pathology; roentgenologic diagnosis; treatment; prognosis.

Lantern slides and roentgenograms will be used for illustration.

COURSE 416

Room 110 F **Period: T**

GEORGE LEVENE, M.D.,
Boston, Massachusetts

Roentgenologic Diagnosis of Acquired Heart Disease

Part I

Roentgen anatomy of the heart and great vessels
Cardiac measurements
Roentgenoscopic technique and pathognomonic roentgenologic appearances
Analysis of roentgen observations
Mitral stenosis
Mitral insufficiency
Aortic stenosis
Aortic insufficiency
Combined valvular lesions
Tricuspid insufficiency
Pericardial effusion
Constrictive pericarditis

COURSE 417

Room 110 F **Period: W**

GEORGE LEVENE, M.D.,
Boston, Massachusetts

Roentgenologic Diagnosis of Acquired Heart Disease

Part II

The heart in myxedema, thyrotoxicosis, Addison's disease, beriberi, anemias, leukemia, cachexia
Hypertensive heart disease
Coronary heart disease
Aortitis
Aneurysm (and differential diagnosis from other mediastinal masses)
Dissecting aneurysm
Arteriovenous aneurysm
Ventricular failure

The lungs in heart disease

The presentations will consist of slides and charts, supplemented by a demonstration of typical roentgenoscopic appearances with the "mechanical heart."

COURSE 418

Room 122 F **Period: W**

A. S. MACMILLAN, M.D.,
Boston, Massachusetts

Roentgen Examination of the Sinuses

1. Roentgen examination of the sinuses is a very important part of the diagnosis of pathology in these locations. The rhinologist is dependent upon a correct interpretation of the sinus roentgenograms. The findings should be reported in terms of pathology, and not in the indefinite roentgenological terms so often used. In this presentation, the technique of examination and interpretation will be considered as fully as time will allow.

COURSE 419

Room 122 F **Period: Th**

A. S. MACMILLAN, M.D.,
Boston, Massachusetts

Roentgen Examination of the Mastoids

2. The use of chemotherapy and antibiotics has greatly changed the course of infection in the mastoid. Pediatricians and general medical practitioners sometimes feel competent to treat this condition, but too often the treatment is inadequate. The roentgenologic examination of the mastoid is the only dependable source of information. This should be recognized because mastoiditis is still prevalent. Acute and chronic infections of the mastoid and the complications will be discussed.

COURSE 420

Room 122 F **Period: F**

A. S. MACMILLAN, M.D.,
Boston, Massachusetts

Film Reading Session

3. *The film reading session* will consider conditions met in a hospital devoted to treatment of the sinuses, mastoids and abnormalities of the esophagus. Rare and unusual conditions are often emphasized in a presentation such as this, with failure to give adequate consideration to the more common types of pathology met with every day. This discussion will deal with the more commonly encountered abnormalities in which roentgenologic assistance is sought.

The new projector developed by Doctors Dillon and Murphy which makes it possible to show four original roentgenograms of the sinuses at one time will be used.

COURSE 421

Room 120 F **Period: W**

EDWARD B. D. NEUHAUSER, M.D.,
Boston, Massachuetts

Certain Aspects of the Gastrointestinal Tract in Infants and Young Children

In this course, no effort will be made to cover all the possible abnormalities and diseases that are seen or which reflect themselves in abnormalities of the alimentary tract.

Particular attention will be given to the technique of examination of the esophagus and gastrointestinal tract in infants and in young children and also to the technique of examination of the colon in infants.

Particular attention will be devoted to congenital anomalies and resulting diseases of the esophagus, certain unusual forms of herniation of the bowel into the thorax, and considerable attention will be given to the problems of duplication of the alimentary tract.

Malrotation of the bowel, congenital stenosis and atresia and study of the patient with imperforate anus will be discussed.

Several other anomalies and acquired lesions will be discussed briefly.

COURSE 422

Room 111 F **Period: Th**

LESTER W. PAUL, M.D.,
JOHN H. JUHL, M.D.,
Madison, Wisconsin

Peripheral Carcinoma of the Lung

A brief analysis of a series of cases of bronchogenic carcinoma will be presented to show the relative frequency of peripheral and central tumors, the differences in clinical behavior and the predominant histopathologic types. This will be followed by a discussion of the roentgen characteristics of peripheral tumors considered from the standpoint of whether (1) the lesion is symptomatic when first seen, (2) the presenting complaints are primarily due to distant metastases, or (3) the lesion is entirely silent clinically. Concerning this latter group of asymptomatic tumors mention will be made of other lesions which offer problems in differential diagnosis, the methods of roentgen examination which may be helpful and our current concepts of treatment of individuals with small, asymptomatic intrathoracic mass lesions.

COURSE 423

Room 111 F **Period: F**

LESTER W. PAUL, M.D.,
JOHN H. JUHL, M.D.,
Madison, Wisconsin

Roentgen Aspects of Osteosclerosis

The major part of this period will be given over to a survey of the diseases and conditions which may cause a relatively widespread diffuse increase in density of the bones. Included will be a discussion of the bone changes in osteopetrosis (Albers-Schönberg), fluorine poisoning, sickle-cell anemia, Paget's disease, metastases, leukemia, polycythemia vera, and osteosclerosis with myelofibrosis and myeloid metaplasia of the spleen. This will be followed by a discussion of the more localized forms of sclerosis and the differential diagnosis of such conditions.

COURSE 424

Room 121 F **Period: T**

HAROLD O. PETERSON, M.D.,
St. Paul, Minnesota

The Normal and Abnormal Skull

This will be a short review of some of the more pertinent and practical aspects of the roentgenologic diagnosis of the normal and abnormal skull. Many interesting features of the anatomy of the normal skull and the normal variations will be illustrated without trying to cover all of the usually well known findings. In like manner a few salient facts about some of the abnormalities which can be recognized on the plain films will be demonstrated. Emphasis will be placed at all times on a practical everyday approach to the interpretation of roentgenograms of the skull, together with a few ideas on technique.

COURSE 425

Room 121 F **Period: W**

E. GRAEME ROBERTSON, M.D. (Melb.),
Melbourne, Victoria, Australia

Encephalography: Physical Aspects and Technique

A method of encephalography based upon information provided by roentgenography during the progress of filling is illustrated by cinematography. The reasons for the entry of gas into the ventricles is discussed. It is suggested that, while the entry of gas into the cisterna magna and fourth ventricle is due to flotation of gas, the passage through the aqueduct of Sylvius and third ventricle into the lateral ventricles is due to expansion of the latter cavities. This alone determines entry when the head is flexed to such a degree that the foramen of Monro is lower than the aqueduct. When the head is more erect a downflow of fluid follows each upward passage of gas. The reproduction of these physical phenomena is illustrated *in vitro*. The information obtained allows of increased efficiency in filling the ventricles.

The initial roentgenograms show whether the gas enters the ventricular system, whether its upward passage is impeded or whether it passes along other routes. The reasons for failure of ventricular filling, and the modifications of technique necessary to secure filling, are illustrated. Means of reducing immediate and subsequent discomfort, and diminishing risk are suggested.

Each encephalography becomes a search for the suspected lesion, and every effort is made to show the region where a lesion is suspected. This point is illustrated in the demonstration of the posterior cranial fossa and the suprasellar region.

COURSE 426

Room 121 F **Period: Th**

HAROLD O. PETERSON, M.D.,
St. Paul, Minnesota

Normal and Abnormal Cerebral Pneumography

Encephalography and ventriculography will be considered together. There will be no discussion on technique other than to illustrate the positions used in the routine examination. Minimum essentials of neuroanatomy will be stressed. Confusing patterns which occur frequently and are actually normal will be illustrated and explained. There will be a few general remarks on atrophic lesions. The fundamental deformities and displacements caused by masses will be shown and discussed.

COURSE 427

Room 121 F **Period: F**

HAROLD O. PETERSON, M.D.,
St. Paul, Minnesota

Normal and Abnormal Cerebral Angiography

The discussion will deal primarily with carotid angiography. The technique has been extremely simplified, and although it may not be the best, it is devoid of gadgets and special equipment and can be instituted immediately on any standard roentgenographic machine. The normal and its variations will be stressed. Most of the abnormal conditions which can be demonstrated with reasonable certainty will be illustrated.

COURSE 428

Room 112 F **Period: Th**

GERALD M. PETERSON, M.D.,
Louisville, Kentucky

Spinal Myelography

The anatomy of the spine, of the spinal cord and meninges will be reviewed. The importance of plain films of the spine with technical considerations will be discussed in relation to myelography. Indications for and techniques of myelography will be considered in detail with a brief historical background. Hazards, limitations and complications of myelography will be illustrated together with representative lesions of the spine, the intervertebral discs, the meninges and the spinal cord.

COURSE 429

Room 115 F **Period: F**

EVERETT L. PIRKEY, M.D.,
Louisville, Kentucky

Correlation of the Roentgen and Gross Pathologic Findings in Lesions of the Gastrointestinal Tract

A review of the roentgenograms of lesions of the gastrointestinal tract, with photographs of the gross specimens of these lesions. An attempt will be made to explain the various roentgen changes seen on the basis of the actual pathologic findings.

COURSE 430

Room 115 F **Period: Th**

IGNACIO V. PONSETI, M.D.,
Iowa City, Iowa

Roentgenographic Studies of Congenital Dislocation of the Hip

The greatest number of patients with congenital dislocation of the hip are born with a dysplastic hip joint and the dislocation is often not well established until after the patient begins to walk. Prenatal dislocations are rare. When the treatment of congenital hip dislocation is started during the first months of life, the results are almost uniformly good. Early diagnosis of congenital hip dysplasia is imperative. Clinical and roentgenological signs of hip dysplasia will be evaluated as related to the anatomy of the normal and the dysplastic hip joint of the newborn. The technique of arthrography of the hip and the findings in the arthrogram will be studied.

The pertinent findings in the roentgenograms taken after the reduction of the dislocated hip will be reviewed. Roentgenograms taken every three months to check the development of the hip joint are necessary, and the main features one must observe in order to direct the treatment will be studied. Roentgenograms of hips after acetabuloplasty or shelving operations will be presented.

COURSE 431

Room 117 F **Period: Th**

LAURENCE L. ROBBINS, M.D.,
WILLIAM R. EYLER, M.D.,
Boston, Massachusetts

Roentgen Examination of the Acute Abdomen

The responsibility of the radiologist in the diagnosis of acute abdominal conditions is great. The conduct of the roentgen examination of such patients and the findings which are of assistance in the differential diagnosis will be discussed.

COURSE 432

Room 113 F **Period: W**

WILLIAM W. STANBRO, M.D.,
Washington, D. C.

The Roentgen Manifestations of Bronchiogenic Carcinoma

The roentgen findings associated with primary carcinoma of the lung will be discussed and correlated with the gross pathology as demonstrated in lantern slides of the operative and autopsy specimens. Particular attention will be directed to the following:

1. The early hilar changes in bronchiogenic carcinoma.
2. The variations in the appearance of the tumor mass.
3. The roentgen changes resulting from the bronchial obstruction and inflammation associated with bronchiogenic carcinoma.
4. The limitations of roentgen methods, including bronchography and planar roentgenography in the diagnosis of bronchiogenic carcinoma.

COURSE 433

Room 120 F **Period: F**

CLYDE A. STEVENSON, M.D.,
Temple, Texas

The Conduct and Some Applications of the Roentgenologic Examination of the Colon

The roentgenologist is responsible for the detection of any organic lesion of the colon above the level of proctoscopic reach. Because of the marked normal variations in size, shape and position of the colon and because of the varied roentgenologic manifestations of disease no one type of examination is completely satisfactory for all conditions.

The discussion will be concerned with the most advantageous procedure in neoplastic, ulcerative

and miscellaneous diseases of the colon. A method for the production of superior double contrast roentgenograms will be given in detail.

A printed outline and sample roentgenograms will be available for each registrant.

COURSE 434

Room 118 F **Period: Th**

PAUL C. SWENSON, M.D.,
Philadelphia, Pennsylvania

The Use of Roentgen Methods in Obstetrics

The roentgen ray is employed to solve many a problem in obstetric management, and these problems will be discussed in as much detail as time allows, paying particular attention to the problem of fetal-pelvic relationships at the time of labor. The relative importance of actual measurements of both fetus and the pelvis will be discussed; also the type of reports rendered and the place of the radiologist on the team which has to do with the management of the parturient.

CONDENSED SCHEDULE OF COURSES ON TUESDAY, SEPT. 25, 1951

Code: T		Code: T	
Therapeutic Radiology, Radiation Physics, Miscellaneous Subjects		**Diagnostic Roentgenology**	
301—Del Regato (Room 117 F)	Treatment of Cancer of the Skin	**402—Coe (Room 112 F)**	Diagnostic Urography
308—R. W. Johnson (Room 118 F)	Radiation Therapy of Vascular Nevi	**404—Cooley (Room 119 F)**	Roentgen Diagnosis of Congenital Cardiovascular Anomalies
204—Parker (Room 114 F)	Radiation Dosimetry	**405—Cooper (Room 120 F)**	Limitations of Roentgen Diagnosis
101—Donaldson (Room 111 F)	Practice of Radiology in the United States—Facts and Figures	**407—Den (Room 115 F)**	Precise Roentgen Localization of Foreign Bodies in the Eye
104—Wilson Williams (Room 122 F)	Role of the Radiologist in Atomic Warfare	**412—Hodges Holt (Room 113 F)**	Photofluorography of the Chest
		414—Lattman (Room 116 F)	Epiphysitis in Infants and Children
		416—Levene (Room 110 F)	Roentgenologic Diagnosis of Acquired Heart Disease
		424—H. O. Peterson (Room 121 F)	The Normal and Abnormal Skull

CONDENSED SCHEDULE OF COURSES ON WEDNESDAY, SEPT. 26, 1951

Code: W **Code: W**

Therapeutic Radiology, Radiation Physics, Miscellaneous Subjects		Diagnostic Roentgenology	
302—del Regato (Room 117 F)	Indications for Treatment of Cancer of the Larynx	**403—Coe (Room 112 F)**	Diagnostic Urography
304—Jacox (Room 119 F)	Place and Technique of Radiation Therapy in Cancer of Breast	**409—Gould (Room 115 F)**	Accuracy of Interpretation of Chest Roentgenograms
305—Lampe (Room 118 F)	Radiation Therapy of Selected Non-malignant Conditions	**413—L. C. Johnson (Room 111 F)**	General Biology of Bone Tumors
202—Evans (Room 114 F)	Biophysical and Biochemical Effects of Ionizing Radiation	**415—Lattman (Room 116 F)**	Diseases Causing Skeletal Changes in Infants and Children
		417—Levene (Room 110 F)	Roentgenologic Diagnosis of Acquired Heart Disease
		418—Macmillan (Room 122 F)	Roentgen Examination of Sinuses
		421—Neuhauser (Room 120 F)	Gastrointestinal Tract in Infants and Young Children
		425—Robertson (Room 121 F)	Encephalography: Physical Aspects and Technique
		432—Stanbro (Room 113 F)	Bronchiogenic Carcinoma

CONDENSED SCHEDULE OF COURSES ON THURSDAY, SEPT. 27, 1951

Code: Th		Code: Th	
Therapeutic Radiology, Radiation Physics, Miscellaneous Subjects		**Diagnostic Roentgenology**	
303—Hunt (Room 113 F)	Radioiodine in Thyroid Disease—Clinical and Radiological Aspects	**408—Golden Collins (Room 120 F)**	The Small Intestine
307—Martin (Room 116 F)	Cancer of the Face, Mouth and Neck Treated with Irradiation Alone	**410—Harvey (Room 119 F)**	Skeletal Changes in Diseases of Infants and Children
203—Morgan Sturm (Room 114 F)	The Place of Electronics in Roentgenology	**419—Macmillan (Room 122 F)**	Roentgen Examination of the Mastoids
102—Edwards (Room 110 F)	Pathologic Features Associated with Dilatation of Major Pulmonary Arteries	**422—Paul Juhl (Room 111 F)**	Peripheral Carcinoma of the Lung
		426—H. O. Peterson (Room 121 F)	Normal and Abnormal Cerebral Pneumography
		428—G. M. Peterson (Room 112 F)	Spinal Myelography
		430—Ponseti (Room 115 F)	Roentgenographic Studies of Congenital Dislocation of the Hip
		431—Robbins Eyler (Room 117 F)	Roentgen Examination of the Acute Abdomen
		434—Swenson (Room 118 F)	Use of Roentgen Methods in Obstetrics

CONDENSED SCHEDULE OF COURSES ON FRIDAY, SEPT. 28, 1951

Code: F		Code: F	
Therapeutic Radiology, Radiation Physics, Miscellaneous Subjects		**Diagnostic Roentgenology**	
306—Leddy (Room 118 F)	Roentgen Therapy for Malignant Tumors of the Testis	**401—Baensch (Room 112 F)**	Changes in the Relief Pattern of the Mucous Membrane of the Alimentary Canal in Precancerosis
309—Portmann (Room 119 F)	Contact Roentgen Therapy for Superficial Lesions		
310—Wood (Room 116 F)	Radiation Treatment of Primary Tumors of the Brain and Spinal Cord	**406—Corrigan (Room 113 F)**	Diagnostic Use of Radioisotope Tracers
201—Andrews (Room 114 F)	Concepts of Biological Dose and Aspects of the Time Factor	**411—Hilbish (Room 117 F)**	Cardiovascular Measurements
103—Edwards (Room 110 F)	Congenital Diseases of the Aorta	**420—Macmillan (Room 122 F)**	Film Reading Session
		423—Paul Juhl (Room 111 F)	Roentgen Aspects of Osteosclerosis
		427—H. O. Peterson (Room 121 F)	Normal and Abnormal Cerebral Angiography
		429—Pirkey (Room 115 F)	Correlation of Roentgen and Gross Pathologic Findings in Lesions of the Gastrointestinal Tract
		433—Stevenson (Room 120 F)	Roentgenologic Examination of the Colon

CANCER SEMINAR

The yearly Cancer Seminar, sponsored by the Penrose Cancer Hospital, will be held at the Broadmoor Hotel in Colorado Springs on September 8, 1951. This year the Seminar will be devoted to 15 cases of mediastinal and pulmonary lesions. Photographic copies of the roentgenograms and clinical summaries of these cases will be sent to the participating radiologists. Histopathologic slides of the same cases and their clinical summaries will be sent to the participating pathologists. Dr. Arthur Purdy Stout, Associate Professor of Surgical Pathology, of Columbia University, and Dr. Philip J. Hodes, Professor of Radiology, of the University of Pennsylvania, will be the guest speakers. Dr. L. Henry Garland, Clinical Professor of Radiology, Stanford University, will be participating in the Seminar, and will also be the banquet speaker. Cases will be discussed in succession with audience participation. The proceedings of the Cancer Seminar will be recorded and later edited and published, as in preceding years. Those desiring to attend may write to Dr. James W. McMullen, Penrose Cancer Hospital, Colorado Springs, Colorado.

CONTINUATION COURSE IN ROENTGENOLOGY OF CHEST DISEASES

The University of Minnesota announces a continuation course in Roentgenology of Chest Diseases to be presented at the Center for Continuation Study from October 29 to November 3, 1951. The course will include detailed anatomical and pathological studies of the chest presented by means of lectures and demonstrations. Correlation of this material with clinical and roentgen findings will be emphasized. Visiting faculty members of the course include Dr. W. Edward Chamberlain, Temple University, Philadelphia; Dr. Benjamin Felson, University of Cincinnati; Dr. L. Henry Garland, Stanford University, San Francisco; Dr. George R. Krause, Mount Sinai Hospital, Cleveland; and Dr. Averill A. Liebow, Yale University, New Haven.

Dr. Chamberlain will also give the annual Leo G. Rigler Lecture in Radiology on the evening of Thursday, November 1. Chairman for the course will be Dr. Rigler, Professor and Head of the Department of Radiology. He will be joined by the members of the faculty of the University of Minnesota Medical School and the Mayo Foundation.

SECOND EUROPEAN CONGRESS OF RHEUMATOLOGY

The Second European Congress of Rheumatology, to be held in Barcelona, Spain, September 24 to 27, 1951, has been given an official character by his Excellency the Ministro de la Gobernación because of the important and useful subjects to be taken up at the Congress.

The organization of the Congress is very much advanced. Hundreds of doctors from different parts of the world have already registered. This means that such a Congress has become not only a European Congress, but a world wide event.

Dr. Philip S. Hench, of the Mayo Clinic, Rochester, Minnesota, recipient of the Nobel Prize, 1950, has been officially invited by the Spanish Government. He will be a guest of honor of Spain. Many other outstanding personalities in the field of medicine have also expressed their desire to attend the Congress.

After having accepted many papers, whose number has exceeded all expectations, the Committee of Arrangements has decided to close the period for the submission of papers on August 15, 1951. In this connection, this Committee advises those colleagues, who wish to offer their collaboration, to send their registrations as rapidly as possible since a large representation of world medicine is strongly desirable.

Dr. P. Barceló
Secretary General

Vía Layetana, 31
Barcelona, Spain

FOURTH INTER-AMERICAN CONGRESS OF RADIOLOGY

The Fourth Inter-American Congress of Radiology will be held in Mexico City, Mexico, November 2 to 6, 1952. The officers are as follows: *President*, Dr. Manuel F. Madrazo; *Secretary General*, Dr. Guido Torres Martinez; *Secretary General for Latin America*, Dr. Narno Dorbecker C.; *Secretary General for the United States and Canada*, Dr. Guillermo Santin; *Treasurer*, Dr. Baudelio Villaneuva, Marsella No. 11, Mexico, D. F.

SYMPOSIUM ON NUCLEAR PHYSICS IN EUROPE

Six of the distinguished European physicists who are coming to this country in September will conduct a two day symposium at Oak Ridge, Tennessee, on September 13 and 14, 1951, on the general subject "Nuclear Physics in Europe."

Symposium leaders and their subjects are as follows:

Professor E. Amaldi, University of Rome. Contribution to the Investigation of Extensive Showers.

Professor J. Rotblatt, University of London. Studies of Nuclear Processes Involving 8 mev. Deuterons by the Photographic Method.

Professor R. E. Peierls, University of Birmingham. Problems of Nuclear Forces and Nuclear Structure.

Professor S. Devons, Imperial College of Science and Technology, London. Projected Experiments on Gamma Emission.

Professor P. Huber, University of Basel. Elastic Scattering of Fast Neutrons from Various Light Elements.

Professor J. Mattauch, University of Bern. Problems of Modern Mass Spectrometry.

The symposium is being given under the joint sponsorship of the Oak Ridge National Laboratory and the Oak Ridge Institute of Nuclear Studies. It is unrestricted in nature, and all interested physicists and others are invited to attend.

The symposium will be offered without charge, although those attending will be expected to pay their own living and traveling expenses.

Additional information may be obtained from the University Relations Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tenn.

OFFICERS OF THE AMERICAN RADIUM SOCIETY

At the Thirty-third Annual Meeting of the American Radium Society held in Atlantic City, New Jersey, on June 7, 8, and 9, 1951, the following officers were elected for the year 1951–1952: *President*, Hugh F. Hare, M.D., Boston, Massachusetts; *President-Elect*, Howard B. Hunt, M.D., Omaha, Nebraska; *First Vice-President*, Edith H. Quimby, Sc.D., New York, New York; *Second Vice-President*, Theodore R. Miller, M.D., New York, New York; *Secretary*, John E. Wirth, M.D., Pasadena, California (re-elected); *Treasurer*, Grant H. Beckstrand, M.D., Long Beach, California (re-elected).

NEW ENGLAND ROENTGEN RAY SOCIETY

At the annual meeting of the New England Roentgen Ray Society held on May 18, 1951, the following officers were elected for the ensuing year: *President*, Dr. Joseph H. Marks; *Vice-President*, Dr. Laurence Martineau; *Secretary*, Dr. Laurence L. Robbins; *Treasurer*, Dr. Magnus I. Smedal. The Holmes Annual Lecture was prepared by Dr. Byrl R. Kirklin of Rochester, Minnesota, and was presented by his son, Dr. John Kirklin. The program of the meeting was audible to both Dr. George W. Holmes and Dr. Kirklin over a three way telephone hook-up. Interesting comments were made by Dr. Holmes and Dr. Kirklin. Dr. George Levene, retiring President, presented a year of outstanding programs.

PENNSYLVANIA RADIOLOGICAL SOCIETY

At the meeting of the Pennsylvania Radiological Society held on May 18–20, 1951, the following officers were elected for the coming year: *President*, Dr. Maurice Goldsmith, Pittsburgh; *President-Elect*, Dr.

William V. Dzurek, Pottsville; *First Vice-President*, Dr. Robert P. Meader, Pittsburgh; *Second Vice-President*, Dr. John Boger, Reading; *Editor*, Dr. Carl B. Lenchner. Dr. C. L. Hinkel, of the Geisinger Memorial Hospital, Danville, Pennsylvania, was elected Councillor to the American College of Radiology from this Society.

SOUTH CAROLINA X-RAY SOCIETY

At the May, 1951, meeting of the South Carolina X-Ray Society the following officers were elected: *President*, Dr. Harold S. Pettit, Charleston; *Vice-President*, Dr. Malcolm Mostellar, Columbia; *Secretary-Treasurer*, Dr. Henry E. Plenge, Spartanburg; *Councillor The American College of Radiology*, Dr. George M. Wyatt, Orangeburg. The South Carolina X-Ray Society holds two meetings annually, one at the annual meeting of the South Carolina Medical Association in May and the other at a time announced by the President of the Society.

DR. K. J. FRANKLIN, VISITING PROFESSOR OF PHYSIOLOGY

Dr. K. J. Franklin who is Professor of Physiology of the University of London at St. Bartholomew's Hospital Medical College has been appointed Visiting Professor of Physiology at the University of Illinois for the academic year beginning September 1, 1951. His address there will be: Department of Physiology, College of Natural Arts and Science, Urbana, Illinois. Dr. Franklin worked with the late Dr. A. E. Barclay on many of his radiological investigations (e.g., the renal circulation), so that there are many radiologists in this country who will be interested to know of Dr. Franklin's visiting appointment.

ABSTRACTS OF RADIOLOGICAL LITERATURE

Department Editor: T. Leucutia, M.D., Harper Hospital, Detroit 1, Michigan

INDEX TO ABSTRACTS

ROENTGEN DIAGNOSIS

Head

Cregg, H.: Linea innominata 286

Beau, H., Rouquès, L., and Gérard, P.-L.: Roentgen appearance of angioma of the petrous portion of the temporal bone 286

Capps, F. C. W., and Williams, I. G.: Discussion on malignant diseases of the nasal cavity and sinuses 286

Jones, W. A., Gerrie, J., and Pritchard, J.: Cherubism—a familial fibrous dysplasia of the jaws 287

Neck and Chest

Hudson, T. R., and Head, J. R.: Syphilis of the esophagus 287

Gebauer, P. W.: Experiences with surgical reconstruction of the trachea 288

Seybold, W. D., *et al.*: Tumors of the thymus. 288

Godwin, J. T., *et al.*: Primary intrathoracic neurogenic tumors 288

Romanini, A., and Spadoni, M.: Contribution of stratigraphy associated with artificial anterior pneumomediastinum to the roentgenographic examination of the mediastinum 288

Thomas, N. K., and Chesser, I. M.: Cavernous hemangioma of the mediastinum 289

Halle, S., and Blitz, O.: Eroding calcified mediastinal lymph nodes 289

Crombie, D. W., and Andrus, P. M.: Vertical tomography of the thorax 289

Delie, P., and Sourdat, P.: Use of water-soluble iodine products for bronchography 290

Cauley, J. H.: Results of the Boston chest x-ray survey 290

Rothstein, E., and Landis, F. B.: Infrapulmonary pleural effusion 291

Carter, M. G., Gaensler, E. A., and Kyllonen, A.: Pneumoperitoneum in the treatment of pulmonary emphysema 291

Hurst, A., and Millner, T.: Segmental collapse in therapeutic pneumothorax 291

Hurley, G. A. P.: Some aspects of cavity behavior in pulmonary tuberculosis 292

Miller, J. B., Abramson, H. A., and Ratner, B.: Aerosol streptomycin treatment of advanced pulmonary tuberculosis in children 292

Green, P.: Pulmonary calcification and histoplasmin sensitivity 292

Brown, A. L.: Lipoid pneumonia resulting from a dermoid cyst 293

Royce, B. F.: Criteria for clinical diagnosis of syphilis of the lung 293

Yardumian, K., and Myers, L.: Primary Hodgkin's disease of the lung 293

Spear, P. W.: Acanthosis nigricans associated with cancer of the lung 293

Graham, E. A.: Considerations of bronchiogenic carcinoma 294

van der Stricht, J.: Direct and retrograde aortography 294

Priviteri, C. A., and Gay, B. B., Jr.: Aneurysm of the pulmonary artery 294

Soloff, L. A., and Bello, C. T.: Pericardial effusion mistaken for cardiac enlargement in severe anemia 294

Kjellberg, S. R., and Rudhe, U.: Electrokymographical studies of coarctation of the aorta 294

Schwedel, J. B., Samet, P., and Mednick, H.: Electrokymographic studies of abnormal left ventricular pulsations 295

Samet, P., Mednick, H., and Schwedel, J. B.: Electrokymographic studies of the relation between the electrical and mechanical events of the cardiac cycle in Wolff-Parkinson-White syndrome 295

Zinsser, H. F., Jr., Kay, C. F., and Benjamin, J. M., Jr.: Electrokymograph 296

Mednick, H., Schwedel, J. B., and Samet, P.: Electrokymographic studies of the normal cardiac cycle 296

Abdomen

Scarinci, C.: Retropneumoperitoneum 296

Meyer, H. W.: Diaphragmatic hernia 297

Simmons, E. E., *et al.*: Hiatus hernia 297

Palmer, W. L.: Certain aspects of benign and malignant gastric ulcer 298

Maggi, A. C., Remolar, J. M., and Meeroff, M.: Osseous metastasis in cancer of the stomach 298

Brown, C. L.: Role of the internist in the detection and early diagnosis of gastric carcinoma 298

Hodges, F. J.: Standard radiologic methods used in the search for gastric tumors 299

Gianturco, C.: Examination of the stomach by "oil contrast" ... 299
Stovall, W. D.: Histologic characteristics and growth behavior of primary gastric tumors ... 299
Moyer, C. A., and Clayton, S. L.: Present status of the surgical treatment of gastric tumors ... 299
Zatzkin, H. R., and Riera, A.: Upper gastrointestinal examination after gastric surgery ... 300
Ende, N., *et al.*: Plasma-cell tumor of the stomach ... 300
Allen, R. P.: Cardio-esophageal relaxation ... 300
Feldman, M.: Perforation of peptic ulcer ... 301
Dorfman, M.: Carcinoma associated with diaphragmatic herniation of the stomach ... 301
Zárate, E., and Koch, W.: Roentgen study of the small intestine ... 301
Ravitch, M. M., and McCune, R. M., Jr.: Intussusception in infants and children ... 302
Dannenberg, M., *et al.*: High gastrointestinal obstruction in the newborn infant ... 302
Reveno, W. S.: Intestinal lipodystrophy (Whipple's disease) ... 303
Frazer, A. C.: Idiopathic steatorrhoea ... 303
Grossman, J. W., Fishback, C. F., and Lovelace, W. R., II: Hemorrhage from a Meckel's diverticulum as a cause of melena in infancy ... 303
Greenwood, F., and Samuel, E.: Radiological features of Jackson's membrane ... 304

Gynecology and Obstetrics

Marshak, R. H., Poole, C. S., and Goldberger, M. A.: Hysterography and hysterosalpingography ... 304
Dyer, I.: Clinical evaluation of x-ray pelvimetry ... 304
Beresford, O. D., and Aidin, R.: Meigs's syndrome ... 304
Kaufmann, Louise A., Cuyler, W. K., and Ross, R. A.: Intraepithelial carcinoma of the cervix ... 305
Pund, E. R., and Echols, J. M.: Subclinical carcinoma of cervix uteri ... 305
Walker, A. H. C.: Foetus retained in abdomen following uterine rupture ... 305
Te Linde, R. W.: Urological aspects of gynecology ... 305

Genitourinary System

Matthei, L. P.: Improved pediatric excretory urography ... 306
Danzer, J. T.: Spontaneous pneumaturia ... 306
Hurwitz, A., and Albertson, H. A.: Cervical osteomyelitis and urinary-tract infection caused by Escherichia coli ... 307
Carlson, H. E.: Supernumerary kidney ... 307
Prather, G. C.: Differential diagnosis between renal tumor and renal cyst ... 307
Boyd, R. W.: Adrenal neuroblastoma ... 307
Koffler, I., *et al.*: Case of pheochromocytoma ... 308

Skeletal System

Solomon, W. M., and Stecher, R. M.: Chronic absorptive arthritis or operaglass hand ... 308
Fitzgerald, H. W.: Bilateral perilunar dislocation of the carpus ... 308
Jeffery, C. C.: Fractures of the head of the radius in children ... 308
Roberts, N., and Hughes, R.: Osteochondritis dissecans of the elbow joint ... 309
Hucherson, D. C.: Ainhum (dactylolysis spontanea) ... 309
Abel, M. S.: Sacroiliac joint changes in traumatic paraplegics ... 309
Hofmann, A.: Importance of the roentgen diagnosis in the operative treatment of disc prolapses ... 310
Armstrong, J. R., *et al.*: Discussion on the significance of congenital abnormalities of the lumbosacral region ... 310
Macnab, I.: Spondylolisthesis with an intact neural arch— the so-called pseudo-spondylolisthesis ... 311
Wilkinson, M. C.: Pregnancy and skeletal tuberculosis ... 311
Seghini, G.: Tuberculosis of the anterior pelvic girdle (pubis and ischium) in childhood and prepuberty period ... 312
Kolb, O.: Follow-up studies on nailed fractures of the femoral neck ... 312
Robson, P. N.: Large calcified lipoma of the thigh ... 313
Gentil, F.: Excision of the shaft of the tibia for sarcoma ... 313
Ramioul, H., Gomez, J., and Damiean-Gillet: Eosinophilic granuloma of the bone ... 313
Walker, D. G., and Lucas, R. B.: Eosinophilic granuloma ... 314
Karpinski, F. E., Jr., and Martin, J. F.: Skeletal lesions of leukemic children treated with aminopterin ... 314
Kleinsorge, H.: Acro-osteolytic manifestations of osteomalacia ... 315
Vogt, A.: Generalized hyperostosis and similar systemic diseases of the bones ... 315
Fairbank, H. A. T.: Fibrocystic disease of bone ... 315
Exner, G.: Chondromatosis, dyschondroplasia, Ollier's growth disturbance ... 317
Strang, C., and Rannie, I.: Dyschondroplasia with haemangiomata (Maffucci's syndrome) ... 317
Mignoli, E., and Cocchi, U.: Roentgen diag-

nosis and radiation therapy of osteoclastoma 318
Vaughan-Jackson, O. J.: Osteoid osteoma with unusual symptoms 318

Blood and Lymph System

Ravelli, A.: Roentgenographic study of arteria lusoria 318
Martin, R. S., and McCleery, R. S.: Improved method of venography for the preoperative evaluation of the postphlebitic extremity 319
Dotter, C. T., Payne, Mary Ann, and O'Sullivan, W.: Catheterization of the portal vein in man following portocaval anastomosis 320
March, H. C.: Leukemia in radiologists in a 20 year period 320
Haden, R. L., and Portmann, U. V.: Extremely high lymphocyte count in lymphatic leukemia 320
Mosbech, J., and Videbaek, A.: Mortality from and risk of gastric carcinoma among patients with pernicious anemia 320

General

Magner, D.: Exfoliative cytological diagnosis 321
Clara, R., and Thys, L.: General interstitial calcinosis (calcinosis interstitialis generalisata) 321
McCarroll, H. R.: Clinical manifestations of congenital neurofibromatosis 322
Neill, Catherine A., and Dingwall, Mary M.: Syndrome resembling progeria 322
Thomson, J., and Forfar, J. O.: Progeria (Hutchinson-Gilford syndrome) 322

RADIATION THERAPY

Jackson, H. S., and New, G. B.: Carcinoma of the buccal mucosa 323
Diethelm, L.: Radiation therapy of operable carcinoma of the breast 323
Deist, H.: Roentgen therapy of residual tuberculous cavities following thoracoplasty ... 323
Schindler, R., Schlosberg, S. S., and Benjamin, M.: Radiation therapy of carcinoma of the cardia 324
Jewett, H. J.: Carcinoma of the bladder 324
Evans, O. T.: Radiation proctitis 325
Miller, C. O., Buehrig, M. R., and Haeger, R. R.: Study of carcinoma of the prostate before and after advent of hormonal therapy 325
Weber, L. L.: Intracavitary radium at time of vaginal plastic operation 325
Swyngedauw, J., Geneau, P., and Montaigne, E.: Complementary roentgen therapy in cancer of the uterine cervix 326
Mallet, L., Moulonguet, P., and Decker, R.: Transvaginal therapy with penetrating roentgen rays in carcinoma of the uterine cervix 326
Ries, J.: Operation or irradiation of carcinoma of the uterine cervix? 326

RADIOISOTOPES

Veall, N.: Diagnostic and therapeutic uses of radioactive isotopes. I. Some general problems in connection with the measurement of radioactivity in patients 326
Haigh, C. P., and Reiss, M.: Diagnostic and therapeutic uses of radioactive isotopes. II. Some applications of I^{131} and Na^{24} to clinical diagnoses 327
Marcus, R., and Rotblat, J.: Diagnostic and therapeutic uses of radioactive isotopes. III. Application of radioactive isotopes in a case of multiple melanomata 328
Macgregor, A. G.: Diagnostic and therapeutic uses of radioactive isotopes. IV. Radioactive iodine in the diagnosis of thyrotoxicosis 329
Paterson, R.: Diagnostic and therapeutic uses of radioactive isotopes. V. Treatment of thyroid carcinoma by radioiodine 329
Warrington, H. C.: Diagnostic and therapeutic uses of radioactive isotopes. VI. Results of treatment of thyroid cancer by radioactive iodine 330
Walton, R. J.: Diagnostic and therapeutic uses of radioactive isotopes. VII. Therapeutic uses of radioactive isotopes in the Royal Cancer Hospital 331
Blomfield, G. W.: Diagnostic and therapeutic uses of radioactive isotopes. VIII. The use of radioisotopes in therapy 331
Freedberg, A. S., *et al.*: Direct measurement of I^{131} uptake in the thyroid gland 331
Pluygers, E.: Pleural carcinomatosis treated with radioactive gold (Au^{198}) 332
Ray, C. T., *et al.*: Distribution of radiomercury of a mercurial diuretic in some of the body fluids of man 332

MISCELLANEOUS

Lansbury, J., *et al.*: Relation of the "antistiffness factor" to collagen disease and calcinosis 333
Cutler, S. J.: Role of morbidity reporting and case registers in cancer control 333
Janker, R.: Universal planar roentgenographic apparatus 333
Broman, T., Forssman, B., and Olsson, O.: Further experimental investigations of injuries from contrast media in cerebral angiography 333
Tod, Margaret: Preliminary notes on an experiment with skin erythema produced by x radiation 334

Holt, Margaret W.: Semiautomatic injection apparatus for use with radioactive solutions 334
Kimeldorf, D. J., Jones, D. C., and Fishler, M. C.: Effect of exercise upon the lethality of roentgen rays for rats 334
Graham, J. B., and Graham, R. M.: Modification of resistance to ionizing radiation by humoral agents 334
Ernst, H. W.: Roentgen tolerance dose 335
Batho, H. F.: X-ray protection 336
Lauritsen, C. C., and Lauritsen, T.: Radiation meter for disaster use 336
Ham, W. T., Jr., and Trout, E. D.: Million-volt beryllium-window x-ray equipment for biophysical and biochemical research 336
Rawlins, F. I. G.: Intensification of the fluorescent image in radiology 337
Titterton, E. W.: Neutron dose determination by the photographic plate method .. 337
Macarini, N.: Indications of planar roentgenography of 1930 as compared with those of planar roentgenography of 1947 337
Seelentag, W.: Method for the exact determination of the desired level in planar roentgenography of sharply delineated objects. 338
Mattsson, O.: Film-faults caused by contact between roentgen films during the development 338
Breck, L. W., and Maylahn, D. J.: New simplified technic for localization of foreign body 338
Vallebona, A.: Axial transverse laminagraphy 338
Haley, T., Mann, S., and Dowdy, A.: Comparison of the response of normal and hypothyroid mice to acute whole body roentgen radiation 338
del Buono, G.: Experimental investigation on the pathogenesis of roentgen sickness 338
Langner, P. H., Jr., and Atkins, J. P.: Intrabronchial electrocardiography 339
Pearl, F., Gray, N., and Friedman, B.: Retrograde aortography with a special catheter, including demonstration of the coronary arteries 339
Hedin, R. F., Miller, W. R., and Jelatis, D. G.: Effect of beta irradiation on gastric acidity 339
Seedorf, E. E., *et al.*: Priodax and pseudoalbuminuria 340
Charles, D. R.: Radiation-induced mutations in mammals 340
Lacassagne, A.: Cancers caused by hormonal action 340

ROENTGEN DIAGNOSIS

Head

Cregg, Hugh. The linea innominata. *Radiology*, Aug., 1950, *55*, 274–276.

The linea innominata is a roentgenological entity produced through a superimposition of densities projected through the orbit in the posteroanterior view. It is seen as a straight line passing from the upper outer margin to the medial floor within the orbit.

By removing various segments of bone from a quarter section of the skull, it was shown roentgenographically that this oblique lateral line is composed in its entirety by the tangential projection of the temporal surface of the greater wing of the sphenoid.—*E. E. Seedorf, M.D.*

Beau, H., Rouquès, Lucien, and Gérard, P.-L. l'angiome du rocher et son aspect radiographique. (Roentgen appearance of angioma of the petrous portion of the temporal bone.) *Presse méd.*, Oct. 18, 1950, *58*, 1141–1143.

Angiomas of the skull are not as rare as previously thought if one considers the increasing number of cases published in the literature. Few of them, however, involve the petrous portion of the temporal bone. The authors describe 1 case in which the symptoms consisted of a slowly progressive right-sided paralysis of the cranial nerves, especially the vth, viith and viiith. This was accompanied by headaches and some papillary edema. Otoscopy revealed a small papillomatous growth in the external auditory canal. Partial removal was attempted and failed. A more extensive excision was done and considerable bleeding occurred. The pathological examination of the specimen revealed the presence of a hemangioma. Roentgenograms of the temporal bone in various projections showed a simple destruction of bone especially at the foramen laceratum on the left side. No other hemangioma was found. On two occasions, radiation therapy successfully relieved the headaches but the papillary edema persisted.

Since hemangioma of the petrous portion of the temporal bone is rare, the authors do not know whether a projection of the hemangioma into the external auditory canal is always encountered, but it seems to be their conclusion that if a papillomatous growth is found in the external auditory canal, one must look for destruction of the petrous bone or the mastoid on the roentgenograms. Such findings should suggest a diagnosis of hemangioma of the petrous portion of the temporal bone.—*J. P. Jean, M.D.*

Capps, F. C. W., and Williams, I. G. Discussion on malignant diseases of the nasal cavity and sinuses. *Proc. Roy. Soc. Med.*, Aug., 1950, *43*, 665–674.

F. C. W. Capps. This discussion is based on 71 cases of all types of malignant tumors of the nasal cavity and sinuses treated in the last twenty years; 39 of the 71 cases were squamous cell carcinomas.

The majority of cases are advanced and seek treatment only when they have severe nasal obstruction or gross deformity. Pain is an early symptom in few cases. Malignant disease in this region remains localized longer than in any other region of the upper respiratory and alimentary tracts with the exception of the larynx. In this series in 5 instances including 3 squamous cell carcinomas and 1 septal epithelioma, there were enlarged lymph nodes present in the tonsillar or submaxillary region when the patient was first seen. Squamous cell carcinoma of the submaxillary lymph nodes appeared later in 1 case.

It is important to secure a biopsy from deep within the growth to avoid a misleading or equivocal report. The risk of lymphatic dissemination in the highly malignant growths as a result of trauma of examination or biopsy must be seriously considered; therefore, frequently three preliminary irradiations were given as a safeguard. The differential diagnosis must be made from syphilis, tuberculosis, benign growths, foreign bodies, rhinoscleroma and Boeck's sarcoidosis.

Good diagnostic roentgenograms are of great value in determining the nature and extent of the lesion. A malignant growth usually gives a very dense ill-defined shadow. In advanced cases there may be obvious bone destruction.

Combined surgery and radiation therapy is the almost universally accepted method of treatment. It yields a higher proportion of success in most types of malignancies than either method alone.

Opinions differ as to the relative merits of pre- and postoperative irradiation. Preliminary irradiation shuts off the periphery and may reduce a large growth to more manageable proportions. In 11 of the 71 patients, complete regression of the primary tumor was achieved by irradiation alone; 9 of the 11 are alive and well three to eighteen years later.

The method of choice of treatment of these tumors was deep roentgen therapy followed by diathermy exenteration and, if necessary, intracavitary radium applied on the surface of a mold made to fit the cavity. Surgical exploration was done as soon as the preliminary erythema and malaise of deep roentgen therapy had subsided. The details of the surgical procedure and after-care are discussed.

The submaxillary and upper deep cervical lymph nodes are included in two of the fields used for irradiating the upper jaw. Two patients with involvement of the submaxillary or upper deep cervical lymph nodes when first seen, are free from disease

three and five years later. A small number of patients developed lymph node metastases after treatment.

Sequestration of bone should not cause undue alarm. Radiation cataract is a frequent sequela. Plastic procedures should be done as indicated by individual need.

Fifty-seven cases, excluding septal ulcers, have been followed five years or more; 2 are untraced. Of these, 22 (38.6 per cent) are symptom free five to twenty years later. A brief review of the results of other reports in the literature is given. It can be concluded that 30–40 per cent of success should be possible in clinics with well established techniques.

Carcinoma of the nasal septum contributed 5 cases to this series. They are considered a problem in themselves. A brief description of each case is given. This carcinoma tends to metastasize more readily than antral and ethmoid carcinoma and the proximity of so much cartilage renders it unsatisfactory for teleradiation.

I. G. Williams: Carcinoma of the antrum. This discussion is based on 26 cases of advanced carcinoma of the antrum involving either the cheek or orbit, fungating into the nose or through the palate. The author has never seen a sase of antral carcinoma that was confined to the site of origin. In spite of the locally advanced state, only 3 of the 26 cases had metastases to the lymph nodes.

The symptoms of early malignant disease in this region do not differ from those of inflammatory antral disease. The frequency of benign conditions compared with the infrequency of carcinoma makes earlier diagnosis unlikely.

Most patients require combined radiation therapy and surgery. Preoperative irradiation gives the surgeon the advantage of a smaller growth of depressed activity. Response to irradiation is greater in a tumor with an intact blood supply.

Great advantages are obtained in these tumors by the use of roentgen rays of 1,000 kv. and over. Supervoltage roentgen therapy decreases the screening effect of the antral bone whereas with 200 kv. therapy there is a high concentration of dose in the bone and immediate surrounding tissue. Also, with supervoltage roentgen therapy the dose is more uniform and hence the likelihood of bone to necrosis is not so great. Teleradium therapy has the same physical advantages as supervoltage roentgen therapy but at least 10 grams of radium are required to deliver an adequate depth dose. The increased depth dose of supervoltage roentgen therapy simplifies the geometry of cross-firing the lesion and permits a wider selection of routes. Vital organs can thus be avoided.

The 26 cases included 21 primary lesions and 5 recurrences. Seventeen patients are dead, 1 untraced, and 8 are alive and well. Of the 15 patients who have been followed five years or longer 1 is untraced and 4 are alive and well. The remaining 4 who are alive and well include 1 who has been followed four years and 3 who were treated within the last two years.

Details of several of the 26 case histories are given. —*D. R. Bernhardt, M.D.*

Jones, W. A., Gerrie, John, and Pritchard, Joseph. Cherubism—a familial fibrous dysplasia of the jaws. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 334–347.

This paper is a report of a condition of fibrous dysplasia of the jaws occurring in 4 brothers and a sister. The patients have been under observation since 1931. To describe the exaggerated chubbiness of their features, Jones in 1931 coined the term "cherubism." The children were active and intelligent with normal interests and social curiosity. Both jaws were felt as hard masses bulging outward to form a bilateral, painless swelling of the face. The deciduous teeth were irregularly placed and many were missing. The alveolar ridges, which were very wide, in the upper jaw gave rise to a narrow V-shaped palate. The submandibular lymphatic nodes were enlarged and histopathological examination of one of them showed thickening of the capsule and fibrosis of the node. Whether these changes represented a subacute inflammatory response secondary to mechanical irritation of the expanding cysts or whether they formed a part of the dysplasia was uncertain. Roentgenographic examination of the other bones showed no abnormality.

Three of the 5 patients were operated upon for correction of the grotesque deformity with satisfactory results. The tissue removed at operation showed a cellular structure with multinucleated giant cells of the osteoclastic type. The stroma varied in different parts of the specimens. The giant cells contained from two to fifty nuclei. In many places the tissue resembled giant cell tumor of bone, but the stroma was more generally of the spindle cell variety and showed more collagenous intercellular deposits. In certain parts it was entirely fibrous with no giant cells. It was considered that the process was a fibrous dysplasia of bone with a partial shift to the osteolytic phase of bone metamorphosis with numerous giant cells and increased vascularity. The paper is well illustrated with photographs of the patients and with reproductions of their roentgenograms.—*R. S. Bromer, M.D.*

Neck and Chest

Hudson, Theodore R., and Head, Jerome R. Syphilis of the esophagus. *J. Thoracic Surg.*, Aug., 1950, *20*, 216–221.

The authors present a case of tertiary syphilis of the esophagus, making a total of 75 cases reported in the literature. Tertiary syphilis of the esophagus may assume one of two forms: a submucous gumma or a diffuse inflammatory reaction with resultant scarring and stenosis.

The symptoms are usually those of a painless dysphagia except in those cases where a tracheo-esophageal fistula is present.

Wilcox has said that the roentgen appearance of tertiary syphilis of the esophagus is more or less characteristic. He describes the walls of the region as being very rigid with little change in contour or size of the barium column as it passes through the stenotic area. The barium has a finely irregular appearance.

The blood serology may or may not be positive and is only of leading diagnostic significance, since an unknown number with any form of esophageal obstruction may have a positive serology.

The treatment and prognosis are discussed.—*T. C. Stansbury, Jr., M.D.*

Gebauer, Paul W. Experiences with surgical reconstruction of the trachea. *Am. Rev. Tuberc.*, Aug., 1950, *62*, 176–189.

Previous series have proved that reconstruction of stenotic bronchi is possible with excellent results in cases of broncho-stenosis. It is therefore reasoned that a similar procedure in treating the stenotic trachea might be of value. In this series of 4 cases a mortality rate of 75 per cent was experienced. These cases are reported in order to prevent a repetition of the errors which the authors realize, in retrospect, to have occurred.

Stenotic lesions of the trachea may be successfully treated by dermal grafts, but the procedure is more formidable than the reconstruction of the bronchial structures. This is due to greater difficulties in administering anesthesia as well as the difficulty of maintaining an adequate airway during surgery and also during the postoperative period. The procedure poses as many problems for the anesthetist as it does for the thoracic surgeon.

A technique for tracheoplasty is described.—*W. A. Klauber, M.D.*

Seybold, William D., McDonald, John R., Clagett, O. Theron, and Good, C. Allen. Tumors of the thymus. *J. Thoracic Surg.*, Aug., 1950, *20*, 195–215.

The authors define thymoma as a specific tumor of the thymus that is characterized by the presence of both thymic epithelial and thymocytic cells in varying proportions. Forty-five cases of thymoma in which tissue specimens from postmortem or surgical operations were available form the basis for this report. Approximately 75 per cent of thymomas occur in patients with myasthenia gravis, and 15 per cent of patients with myasthenia gravis have a thymoma.

The authors suggest routine posteroanterior, and lateral roentgenograms and roentgenoscopy for all cases of myasthenia gravis. Approximately 40 per cent of the tumors in their series were not apparent on the anteroposterior film. Characteristically these tumors occur in the anterior mediastinum. Sufficient calcium to be apparent roentgenologically was present in 13 of the 45 tumors. Peculiar features which would permit a pathologic diagnosis on the roentgenologic findings were lacking, but every anterior mediastinal tumor seen by them in a patient with myasthenia gravis has been a thymoma.

Three-fourths of the thymomas in this series had a distinct fibrous capsule, but the others had broken through their capsule to invade adjacent structures. No evidence was found to suggest that embolic lymphogenous or hematogenous metastasis occurred. In no patient whose tumor has been completely removed has there been evidence of recurrence.

Most of the deaths are due to myasthenia gravis and not to the tumor itself, although in the group with ineradicable lesions the tumor itself is usually fatal. Intensive roentgen therapy for ineradicable tumors seemed to benefit some patients.—*T. C. Stansbury, Jr., M.D.*

Godwin, John T., Watson, William L., Pool, John L., Cahan, William, and Nardiello, Vincent A., Jr. Primary intrathoracic neurogenic tumors. *J. Thoracic Surg.*, Aug., 1950, *20*, 169–194.

This is a presentation of 24 cases of primary intrathoracic tumors of neurogenic origin with special emphasis on the classification and pathologic features of these tumors. The authors use the following general classifications:

I. Tumors of nerve sheath origin.
II. Tumors of sympathetic origin.
III. Tumors of paraganglionic tissue.

The intrathoracic nerve sheath tumors are predominantly encapsulated neurilemmomas. They are benign, rarely, if ever, become malignant and offer a good prognosis. The diffuse neurilemmoma (von Recklinghausen's disease) may frequently (13 per cent according to Hosoi) undergo malignant change.

The nerve cell tumors are predominantly ganglioneuromas. The differentiated variety usually found in the mediastinum is rarely malignant.

The paragangliomas are rare.

Treatment of intrathoracic neurogenic tumors is surgical. Radiation therapy does not offer permanent arrest of these tumors.—*T. C. Stansbury, Jr., M.D.*

Romanini, Attilio, and Spadoni, Mario. Contributo della stratigrafia associata al pneumomediastino anteriore artificiale nella indagine radiologica del mediastino. (Contribution of stratigraphy associated with artificial anterior pneumomediastinum to the roentgenographic examination of the mediastinum.) *Ann. radiol. diag.*, 1950, *22*, 459–464.

In 1936 Condorelli found, by injecting air into the mediastinum, at first in the cadaver and later in living patients, that the mediastinum was divided into anterior and posterior compartments. He further found that air injected into the anterior mediastinum remained localized in that area. This technique has been used by various authors for better roentgenographic visualization of the mediastinal structures especially in enlargement of the thymus or mediastinal lymph nodes, pericardial calcifications and retrosternal cold abscesses.

The authors have supplemented this technique by making planar roentgenograms both in the postero-anterior and lateral projections after routine roentgenograms. Such studies give a better spatial visualization of the anatomical relationship of the various mediastinal organs.

A case report is included with good illustration of a mediastinal shadow noted on a routine postero-anterior chest film in a boy eight years of age. A differential diagnosis had to be made between enlargement of the left auricle, hilar lymph nodes or thymus gland. Films taken after air injection into the anterior mediastinum clearly outlined the shadow of the heart, ruling out left auricular enlargement. Subsequent planar roentgenography at various levels disclosed a tongue-like projection above the heart shadow seen on the lateral films which ruled out enlarged lymph nodes, thus establishing the diagnosis of an enlarged thymus.

The technique is especially recommended for structures in the upper two-thirds of the anterior mediastinum.—*P. E. Russo, M.D.*

Thomas, N. K., and Chesser, Ian M. Cavernous hemangioma of the mediastinum; case report. *J. Thoracic Surg.*, Aug., 1950, *20*, 321–324.

The authors add a case of cavernous hemangioma of the mediastinum to the already reported 17 authenticated cases in the literature. The authors present the case of an eighteen year old female who had vague distress in the left chest that came and went, bearing no relation to effort. The symptoms were noted only in retrospect after having had a chest examination during a National Tuberculosis Association Survey with employment of 70 mm. roentgenograms. Physical examination was entirely negative, but roentgenograms of the chest revealed a rounded mass extending from the hilum into the lung structure in the mid-portion of the lung field with a vertical diameter of approximately 11 cm. The lateral margins were smooth in outline and, on the lateral roentgenograms, the tumor was seen to be located in the anterior mediastinum and superimposed on the heart shadow. The roentgen impression was that of a "teratoid type of tumor in the left chest." Thoracotomy disclosed the tumor to be a large cavernous hemangioma of the mediastinum.

The authors state that surgery should result in permanent cure.—*Moris Horwitz, M.D.*

Halle, Shea, and Blitz, Oscar. Eroding calcified mediastinal lymph nodes. *Am. Rev. Tuberc.*, Aug., 1950, *62*, 213–218.

The erosion of calcified tuberculous mediastinal lymph nodes into the bronchial tree has been frequently reported, but in most previous reports these events with their complications have been viewed in retrospect. The authors have studied 2 cases of perforating calcified tuberculous lymph nodes which were diagnosed early in the course of events, before erosion had caused complete perforation. This syndrome may be suggested by the occurrence of hemoptysis and chest pain in the patient with calcified mediastinal lymph nodes lying near the bronchial tree. A history of previous episodes of coughing up broncholiths is helpful. The diagnosis is confirmed by routine chest films and frequently further assisted by planar roentgenography. Bronchoscopy may reveal localized ulceration or inflammation of the wall of the bronchus adjacent to the site of the perforating calcified mass.

Complications occurring in these cases may be severe. They range from atelectasis of a lobe due to compression to atelectasis due to obstruction of the bronchus after perforation. Secondary suppurative pulmonary disease with bronchiectasis may result. Hemorrhage may be another complication.

These cases must be managed according to the degree of the complications resulting from encroachment of the calcified masses on the bronchial tree. In more severe complications the mass may be removed surgically or even at bronchoscopy whereas in most cases with less severe manifestations, conservative management with careful repeated observation is indicated. In general, the indications for surgery are: severe, recurrent hemorrhage; progressive bronchial stenosis, with or without pulmonary disease secondary to obstruction; severe pain or any other situation where the possible consequences of the erosion seem to endanger the welfare of the patient.—*W. A. Klauber, M.D.*

Crombie, D. W., and Andrus, Paul M. Vertical tomography of the thorax. *Am. Rev. Tuberc.*, Aug., 1950, *62*, 170–175.

The authors advance three reasons for erect positioning of the patient during planar roentgenography: (1) Fluid levels may be demonstrated. (2) Speed of exposure is attained due to the utilization of gravity in this type of positioning, whereas high speed of travel of the tube is deficient in a horizontally moving roentgen ray source. (3) Commonly upright films of the chest in conventional projections delineate pulmonary shadows more adequately than exposures made in the prone or supine positions. This is due, presumably, to altered distribution of

thoracic wall tissues by pressure and gravity and to better expansion of the lungs in the upright.

The authors examined 904 cases, mostly problems in pulmonary tuberculosis, both by ordinary posteroanterior chest films and by vertical planar roentgenograms. Of these cases 44 per cent displayed pulmonary cavitation by planar roentgenography in the vertical position and 21 per cent of these cavities displayed fluid levels. In the plain posteroanterior roentgenograms, according to the authors, cavities were not identifiable in 70 per cent of the series and were suspected but not clearly demonstrated in the remaining 30 per cent.

Examination of the lungs by vertical speed planar roentgenography materially increases the frequency and certainty of tuberculous cavity identification. Since the management of pulmonary tuberculosis is in essence the management of cavities, the method constitutes a highly significant advance in phthisiologic practice.—*W. A. Klauber, M.D.*

Delie, Pierre, and Sourdat, P. Utilisation des produits iodés hydro-solubles pour la bronchographie. Remarques techniques. (Use of water-soluble iodine products for bronchography: technical remarks. *Presse méd.*, Oct. 18, 1950, *58*, 1156–1158.

The substitution of water-soluble iodine preparations for lipiodol in bronchography was originally introduced by Morales in Sweden in order to take advantage of the rapid absorption of the opaque medium in the bronchi.

The authors used an aqueous solution of 50 per cent diiodopyracet rendered viscous by the addition of 2 per cent sodium glycolate cellulose. This new iodine substance is rapidly absorbed by the vascular system of the bronchial epithelium without causing symptoms of iodism. However, the preparation is hypertonic and therefore more irritating than lipiodol. Because of this the authors have outlined a careful preparation of the patient. This includes withholding food for at least six hours and administering morphine and atropine before the examination. If there is considerable bronchial secretion, postural drainage is used and bronchography may even be preceded by bronchoscopy to drain the bronchi. For preliminary anesthesia 4 cc. of 1 per cent pantocaine is instilled into the pharyngolarynx. Following this, 4 cc. of 0.5 per cent pantocaine is injected into the glottic orifice. Then, under fluoroscopic visualization, a bronchial catheter is directed into the main bronchus on the side desired. At this point, 2 cc. of 0.5 per cent pantocaine is injected into the catheter. Before injecting the opaque substance into individual branch bronchi, additional anesthetic is instilled. After films have been made, the patient is asked to cough to rid the bronchi of some of the opaque substance. The remainder is absorbed by the bronchi. One hour following injection the bronchi are free of opacification. Occasionally, a patient with active cough will not tolerate this opaque substance and in these cases advantage is taken of the anesthesia and lipiodol is used without difficulty. When copious secretion is present in the bronchi, dilution of the water-soluble opaque substance occurs and visualization may not be satisfactory. Again in these cases lipiodol may be used or larger quantities of the water-soluble substance may be injected. Unilateral visualization of the bronchial tree seldom requires more than 25 cc. of this water-soluble material.

The quality of the bronchograms is said to be good even though this preparation is less opaque to roentgen rays than is lipiodol. The chest surgeon finds considerable advantage in the use of a rapidly absorbable bronchographic medium because it avoids bronchial obstruction sometimes seen postoperatively when the operation has been preceded by lipiodol bronchography.—*Norman Simon, M.D.*

Cauley, John H. The results of the Boston chest x-ray survey. *New England J. Med.*, Oct. 26, 1950, *243*, 631–636.

Running more or less parellel to the national average is the five year average for Boston. The national trend has declined, persistently, from approximately 180 per 100,000 population, in 1900, to below 40 per 100,000 population. Boston has had a higher rate than the national one, although there has been a steady decline from nearly 250 per 100,000 population at the beginning of the century to the present rate of approximately 60 per 100,000. This need not be too disturbing, since it is accepted that larger cities have a higher rate than rural communities. Statistics show that Boston has a higher rate than almost all the listed eastern cities in the United States.

It was the goal of the planning group to examine over 500,000 persons during the program. Except for the first two weeks at the start of the program, the number of roentgen films taken exceeded the goal set. It was possible to continue in operation one downtown unit two weeks beyond the originally planned sixteen week period and during these two weeks over 4,000 examinations were made at this single unit. At the completion of the program, 536,012 films (70 mm.) had been taken and interpreted by the roentgenologists, exclusive of the 20,030 taken in Boston hospitals.

More than 97 of every 100 films taken were apparently negative. Of the smaller roentgen films 14,465 showed thoracic abnormalities. Of these, 8,070 gave evidence of tuberculosis or suspected tuberculosis, and the remainder showed other intrathoracic abnormalities. During the entire period when the smaller films were being taken, a retake center was operated on Boston Common. All persons who showed evidence of tuberculosis, or other chest

diseases, were requested to return to this center for a standard 14 by 17 inch roentgenogram. At the same time, a résumé of their clinical history was taken.

The number of 14 by 17 inch roentgenograms taken was 9,372. There were thoracic abnormalities in 7,254; 4,122 gave evidence of tuberculosis; 443 were considered suspicious of tuberculosis; and 2,406 represented cases of non-tuberculous chest diseases. From these 14 by 17 inch films, a diagnosis of cardiac diseases was made in 283 cases.

As a direct result of the mass survey program, 247 active cases of tuberculosis among Boston residents have been reported. In an analysis of the residence of persons examined, it was shown that slightly more than 60 per cent were Boston residents.—*E. J. McDonald, M.D.*

Rothstein, Emil, and Landis, Francis B. Infrapulmonary pleural effusion. *Brit. J. Radiol.*, Aug., 1950, *23*, 490–492.

Atypical collections of pleural fluid are rather frequent, and may be overlooked when they blend well with the surrounding structures. A collection between the base of the lung and the dome of the diaphragm is called an infrapulmonary effusion, and because of the concavity of the base of the lung it is frequently mistaken for an elevation of the diaphragm.

This fluid is of the type usually seen in effusions, and there are usually no localizing adhesions to confine it to the infrapulmonary location. Damaged or altered retractibility of the lung has been postulated but never proved. In 13 cases, 1 was in a patient with cardiac disease, 2 were due to malignancy, 1 was a post-pneumonic empyema, 7 occurred during known pulmonary tuberculosis, and in 2 the cause was unknown. In almost every instance the fluid was freely movable, both with diaphragm excursion and with change in the position of the patient. Delineation of the lower surface of the diaphragm by pneumoperitoneum, or by administering carbonated beverages aids in diagnosis. The condition should be differentiated from elevation of the diaphragm, subphrenic abscess, enlarged liver, tumors of the lung, mediastinum or pleura, large basal lung cysts containing fluid, and atelectasis.—*E. F. Lang, M.D.*

Carter, M. G., Gaensler, E. A., and Kyllonen, A. Pneumoperitoneum in the treatment of pulmonary emphysema. *New England J. Med.*, Oct. 12, 1950, *243*, 549–558.

Pulmonary emphysema, with its sequence of emphysema, bronchitis, fibrosis and respiratory insufficiency, is a very disabling disease and has defied attempts at prevention and treatment.

The authors were impressed by the relief of dyspnea in patients who were receiving pneumoperitoneum treatment for active pulmonary tuberculosis in which there was marked emphysema secondary to contracting fibrosis. This observation suggested to them the possibility of using pneumoperitoneum for the treatment of emphysema not associated with tuberculosis. Patients were selected with dyspnea that was incapacitating for work and in whom there was no evidence of cardiac or other pulmonary complications.

A total of 22 patients was studied. Three patients were given pneumoperitoneum after thoracic surgery for carcinoma or lung abscess because of severe symptoms due to associated emphysema. Considerable relief was noted in all three. Thirteen patients reported considerable subjective improvement characterized by reduction in cough and dyspnea, increase in excercise tolerance and ability to sleep flat in bed and raise bronchopulmonary secretions more easily. Maximum improvement was noted six to eight weeks after induction. Refills were given every two weeks.

Fluoroscopic examinations showed paradoxical movement of the diaphragm in 3 cases before treatment, and the average range of diaphragmatic motion was 10 per cent of normal. After treatment no paradoxical motion was observed and the average motion had increased to 40 per cent of normal.

Six patients reported no marked improvement although cough was less and more effective during treatment.

The mode of action of pneumoperitoneum can be seen on fluoroscopy. By restoring the normal arch of the diaphragm, contraction downward again becomes possible. Pneumoperitoneum improves the mechanical efficiency of functioning pulmonary tissue. It does not restore function to permanently damaged portions of the lung. Patients with emphysema associated with bullae and giant cysts or with advanced pulmonary fibrosis were not improved. The authors believe that the cycle of emphysema, infection and fibrosis might be slowed in some cases by early institution of this treatment.—*W. M. Roy, M.D.*

Hurst, Allan, and Millner, Tovy. Segmental collapse in therapeutic pneumothorax. *Radiology*, Aug., 1950, *55*, 228–234.

Tuberculosis of the lung is essentially a segmental or sub-segmental pathologic process. It has been demonstrated that the most frequent lesion occurs in the finer bronchial ramifications. The bronchi involved are edematous, lack normal ciliary motion and are partially filled with detritus. Institution of pneumothorax frequently results in segmental collapse of the diseased lung. Bronchial obstruction, largely due to edema, is the major reason for this selective collapse. Loss of elasticity, neurovascular phenomena and reflex mechanisms are probably other minor factors.

The most perfect form of selective collapse is seen

in pneumothorax where adhesions are absent. The earliest roentgenographic finding is a local condensation of the diseased area with a "dipping in" of the pleura, producing a scalloped effect. The collapsed area may retract toward the hilus to such an extent as to be difficult to recognize as a contracted segment. In some cases roentgenograms made at regular intervals may show considerable variation in the amount of segmental collapse. This changing, evanescent quality of the collapse may be considered as evidence in favor of the claim that edema of the bronchi of the third, fourth, and fifth order is the major reason for the segmental collapse.

Five case reports, with accompanying roentgenograms, are included to illustrate selective collapse of segments, sub-segments, and lobes.—*A. W. Sommer, M.D.*

Hurley, G. A. P. Some aspects of cavity behavior in pulmonary tuberculosis. *J. Thoracic Surg.*, Aug., 1950, *20*, 325–334.

The author discusses the behavior of tuberculous pulmonary cavities as confronted by the clinician and their response to treatment. Modern methods of treatment include collapse therapy, transpleural drainage, and lung resection, with the latter being more frequently employed in those cases not responding to the most radical forms of treatment. The author feels that many cases of pulmonary tuberculosis with cavitation have their chances of survival lessened by radical and perhaps "over-enthusiastic collapse therapy" sacrificing lung function for collapse of the cavity.

It is the feeling of the author that while each of the methods mentioned has its place in treatment, there should be better selection of the type of treatment instituted in each case and that more close attention be given to the behavior of the cavities during the course of treatment. A series of sixteen cavities in 15 patients was studied with the above in mind. It was found that less radical methods of treatment were then being instituted.

It is emphasized by the author that an essential part of the treatment method is the long observation period which was allowed after institution of initial collapse operations. During this period, it was noted that certain cavities would go on to obliteration without further surgical interference and also information was gained regarding the cavities that did not become obliterated which would act as a guide in their further treatment.

Employing the above routine, the author found that more radical surgical procedures were unnecessary in the group of patients analyzed than would otherwise have been instituted.—*Moris Horwitz, M.D.*

Miller, Joseph B., Abramson, Harold A., and Ratner, Bret. Aerosol streptomycin treatment of advanced pulmonary tuberculosis in children. *Am. J. Dis. Child.*, Aug., 1950, *80*, 207–237.

In an attempt to improve the treatment of pulmonary tuberculosis, streptomycin was administered into the lungs as an aerosol in concentrated solution and in large doses, dissolved in a special diluent containing an alkaline buffer and a stable detergent. New techniques were developed which were designed to increase the efficiency of aerosol administration and to adapt the methods to children. These are described in the paper.

The patients treated were 12 children with various forms of pulmonary tuberculosis, at least 5 of whom had a poor prognosis. The disease in all except the 3 children with atelectatic lesions responded to therapy by apparent healing, the most rapid response occurring in the children with the greatest amount of infiltration, consolidation and cavitation. No significant toxicity or sensitivity reactions occurred in any of the patients or personnel.

The authors feel that while no final conclusions can be drawn from so small a series, the favorable results obtained indicate the desirability of further study of the value of their technique, used alone or in combination with other therapeutic procedures. The paper is illustrated with serial roentgenograms of their patients treated.—*R. S. Bromer, M.D.*

Green, Paul. Pulmonary calcification and histoplasmin sensitivity. *Canad. M. A. J.*, Aug., 1950, *63*, 143–146.

A survey was made of 440 veterans admitted to the medical service of Deer Lodge Hospital, Winnipeg, Canada. Chest films were taken of each individual and skin tests with 1/1,000 tuberculin and 1/1,000 histoplasmin were done; 258 cases (59 per cent) reacted positively to the tuberculin test. Of 23 cases (5.2 per cent) who had positive skin reactions to histoplasmin, 15 also had positive tuberculin skin tests. The incidence of pulmonary calcification in the entire group was 14 per cent. In those individuals who did not react to either tuberculin or histoplasmin in these dilutions, the incidence of calcification was 5 per cent. Of those who were tuberculin positive and histoplasmin negative the incidence of pulmonary calcification was 15 per cent; in those who were tuberculin negative and histoplasmin positive the incidence was 63 per cent, and in those who were tuberculin positive and histoplasmin positive 53 per cent. In the histoplasmin negative group there tended to be isolated calcific areas in the lung periphery with often a large area of calcification at the hilus. The histoplasmin-positive group tended to have small areas of calcification scattered throughout the lung fields.

The author noted that this was a selected group of individuals in that all but 12 were males, their ages ranged from eighteen to eighty-two, and that some

members had traveled extensively.—*C. L. Hinkel, M.D.*

Brown, A. Lincoln. Lipoid pneumonia resulting from a dermoid cyst; case report. *J. Thoracic Surg.*, Aug., 1950, *20*, 260–265.

Lipoid pneumonia as we have known it is usually diagnosed on the basis of a long history of the use of oily nosedrops. Vegetable oils are now considered to be non-pathologic while animal and mineral oils are known to cause tissue reaction.

The case presented is that of a young white woman who had a large dermoid cyst, the cavity of which communicated directly with the primary bronchus of the left upper lobe. The cyst contained a viscid animal oil which constantly spilled over into the left bronchial tree and produced the characteristic picture of lipoid pneumonia. The diagnosis was made by biopsy of a mediastinal lymph node and later confirmed on surgical removal of the left lung.—*R. E. Kinzer, M.D.*

Royce, Byron F. The criteria for clinical diagnosis of syphilis of the lung; with report of a case. *Ann. Int. Med.*, Sept., 1950, *33*, 700–707.

In 1924 Howard stated that 200 cases of syphilis of the lung had been reported in the literature. The majority of these were from large autopsy series. In 1932 Hartung and Freedman, and in 1938 Pearson and De Navasquez established the diagnostic criteria of syphilis of the lung which are summarized by the author as follows:

1. History of syphilis: A negative history does not rule out the possibility of a pulmonary lesion being luetic in character.

2. Signs and symptoms of pulmonary disease: Hemoptysis, productive cough, loss of weight and fever may be present.

3. Exclusion of other forms of pulmonary disease: Exclusion of pulmonary tuberculosis by painstaking effort.

4. Positive serologic test: This is not an absolute requirement.

5. Demonstration of *Spirochaeta pallida:* Rarely demonstrated in pulmonary syphilis.

6. Roentgenographic evidence of pulmonary disease: No definite roentgenologic characteristics are present.

7. Therapeutic test: Arsenicals, iodides and penicillin are too nonspecific for use as a therapeutic test but it is believed that penicillin is worthy of trial. Clinical improvement usually follows antisyphilitic treatment. Regression as observed roentgenologically is of greatest importance.

8. Presence of associated lesions in other organs: this is observed quite frequently.

A detailed case history is presented which appears to satisfy the above mentioned criteria for diagnosis of pulmonary syphilis, with signs of associated pathology in the dorsal vertebrae. In the discussion the author comments upon various aspects of the case presented and observes that bronchial narrowing due to other causes may prepare the field for localized syphilitic involvement in a luetic individual. Bronchoscopy is considered to be useful for obtaining specimen of sputum for smear, culture or guinea-pig inoculation.—*W. W. Maver, M.D.*

Yardumian, Krikor, and Myers, Leonard. Primary Hodgkin's disease of the lung. *Arch. Int. Med.*, Aug., 1950, *86*, 233–244.

This is the report of a case of primary Hodgkin's disease of the lung. The authors emphasize that so-called primary Hodgkin's disease of the lung is mostly of the secondary type. In their case a fifty-two year old male presented himself with a history of malaise, weakness, sore throat and six episodes of "black-outs." These had extended over a period of six or seven years. His earlier chest film was not too characteristic but approximately a year later a diffuse granular bilateral process suggested either neoplasm or acid-fast infiltration of a nodular type extending throughout both lung fields. The diagnosis was not clear and a differentiation could not be made.

Postmortem findings indicated that this was a primary Hodgkin's disease of the lungs with the presence of occasional Hodgkin's nodules in the liver. The authors stress the fact that this case is unusual when compared with previously reported cases involving the lungs in that the main focus of the lesion was pulmonary, there was no involvement of the lymph nodes, and no anemia.—*A. J. Present, M.D.*

Spear, Paul W. Acanthosis nigricans associated with cancer of the lung; report of a case. *J. Thoracic Surg.*, Aug., 1950, *20*, 304–309.

Acanthosis nigricans is a disease of the skin in which soft, velvety or verrucous plaques form in such areas as the base of the neck, the axillae, around the genitalia, etc. The color is usually brown to gray and the discoloration extends into the surrounding normal skin. The skin is dry, elevated like elephant hide, and lacks luster.

There are two types of the disease. One type is non-malignant and usually occurs in young persons. The second type is not in itself malignant, but it occurs in association with some type of visceral malignancy in about 50 per cent of cases.

A case of acanthosis nigricans occurring in a fifty year old white male in association with carcinoma of the lung is presented. This is said to be the third proved case of carcinoma of the lung to be reported as occurring with this skin disease. This case is offered as further proof that the skin disease is prob-

ably not secondary to tumor pressure on the adrenals or the sympathetic chain.—*R. E. Kinzer, M.D.*

Graham, Evarts A. Considerations of bronchiogenic carcinoma. *Ann. Surg.*, Aug., 1950, *132*, 176–188.

This article is an excellent discussion of bronchiogenic carcinoma. A brief history of the procedure of lobectomy is given. In discussing the pathology of lung cancer, the author devotes a major part of the paper to facts to support his impression that bronchial adenomas are potentially malignant and should receive radical treatment. It is suggested that these adenomas have their origin in disorganized embryonic bronchial buds which have failed to pursue a normal development. There is much similarity between adenomas and the hamartoma of the liver as described by Albrecht.

In Graham's clinic a positive diagnosis is obtained by the bronchoscope in only 60 per cent of cases. He believes that any patient over forty-five who has a cough and blood-tinged sputum must be considered to have lung cancer until proved otherwise.

When lung cancer is found, the best results are obtained by pneumectomy. This operation has a mortality rate of less than 10 per cent in this author's clinic.—*J. H. Harris, M.D.*

van der Stricht, J. L'aortographie directe et rétrograde. (Direct and retrograde aortography.) *Acta chir. belg.*, July-Aug.-Sept., 1950, *49*, 620–625.

The success of surgical treatment of a vascular lesion is dependent upon diagnostic precision. A study of obliterations of the pelvic arteries can be accomplished by the Dos Santos method of aortography. In certain cases, however, the evaluation requires retrograde catheterization.

Retrograde aortography is not a new method. In 1941 Fariñas demonstrated with great success retrograde catheterization of the abdominal aorta by puncturing the femoral artery and introducing a catheter into this vessel. The thoracic aorta and its branches are opacified by catheterization of the radial artery.

The danger of arterial thrombosis depends somewhat on the mode of introduction of the catheter. This is elaborated upon in detail by the author. Arteriography by catheterization demands the employment of anticoagulants and antispasmodics. The inferior limits of the segmental obliteration of the aorta or of the iliac arteries are not always revealed by simple aortography and retrograde exploration by catheterization may eventually be required.

Three cases are presented and briefly discussed.—*Otto Kasik, M.D.*

Priviteri, Charles A., and Gay, Brit B., Jr. Aneurysm of the pulmonary artery; a case diagnosed by angiocardiography. *Radiology*, Aug., 1950, *55*, 247–253.

Angiocardiography is helpful in the differential diagnosis of hilar lesions. Aneurysms of the pulmonary artery or its subdivisions can be distinguished. A left pulmonary artery aneurysm is reported.

The condition is rare. Etiology is considered under syphilis, congenital defects, pulmonary arteriosclerosis, infections other than syphilis, and trauma. The condition is equally distributed among sexes. Signs and symptoms are not diagnostic.

The roentgen findings depend upon the location of the aneurysm. Involvement of the main trunk of the pulmonary artery will produce a convex homogenous increased density. Aneurysms of the right or left major branches usually produce uniform rounded increased densities overlying either hilus. Expansile pulsations are usually seen. Angiocardiography only will establish the vascular nature of the lesion, identify it with the pulmonary artery, and demonstrate its aneurysmal character—fusiform or saccular.—*E. E. Seedorf, M.D.*

Soloff, Louis A., and Bello, C. T. Pericardial effusion mistaken for cardiac enlargement in severe anemia; report of two cases. *Circulation*, Aug., 1950, *2*, 298–303.

Enlargement of the heart may be due solely to anemia. Two cases are presented, one of erythroblastic anemia and the other of pernicious anemia. In each instance enlargement of the so-called cardiac silhouette was erroneously attributed to severe, long-standing anemia with resultant cardiac dilatation. Pericardial paracentesis confirmed the presence of pericardial effusion as the major factor in enlargement of the cardiac silhouette in each case.

Pericardial fluid may result from irritation of the pericardial membranes by abnormal pigments or by the redistribution of fluid within the functional compartments of body water.

In cases of anemia with enlargement of the cardiac silhouette, pericardial effusion should be considered as a possible etiologic factor.—*Gerald Lavner, M.D.*

Kjellberg, Sven Roland, and Rudhe, Ulf. Electrokymographical studies of coarctation of the aorta. *Acta radiol.*, Sept., 1950, *34*, 145–153.

The constriction in coarctation of the aorta is usually situated distal to the left subclavian artery, at or near the origin of the ductus arteriosus. Occasionally it is found in the arch between the innominate artery and the left common carotid. Multiple constrictions may occur and, at times, they are associated with aneurysms.

Notching of the ribs caused by the pressure of the dilated and tortuous intercostal arteries is present

in only about 60 per cent of the cases. A dilated left subclavian artery, a shortening or dislocation of the aortic arch and absence of the aortic knob are features that are sometimes noted in coarctation of the aorta.

In the electrokymogram done distal to the coarctation, the curve starts later and the rise occurs more slowly than in the normal. The higher frequencies disappear partly or altogether. This gives a more purely sinus-shaped appearance to the curve. In addition, the notch and the subsequent rise in the curve are obliterated to a varying extent.

In making the electrokymographic recordings the photocell was placed first over the ascending aorta and the aortic arch (where the reading was normal). It was then moved down along the descending aorta as far as this could be followed, as a rule halfway to the arch of the diaphragm. It was thereby possible to ascertain the position of the coarctation.

The case material studied consisted of 12 patients with coarctation of the aorta, 2 women and 10 men. Eleven of them belonged to the adult type with the coarctation on a level with the origin of the ductus arteriosus. In the adult type the constriction is more circumscribed than in the infantile type. The diffuse narrowing found in the infantile type is often associated with a cardiac anomaly.—*Mary Frances Vastine, M.D.*

Schwedel, John B., Samet, Philip, and Mednick, Henry. Electrokymographic studies of abnormal left ventricular pulsations. *Am. Heart J.*, Sept., 1950, *40*, 410–429.

The left ventricular electrokymographic pattern was studied in 31 cases of anterior wall myocardial infarcts, in 28 posterior wall infarcts, and in 11 combined anterior and posterior wall infarcts. In all 70 cases the diagnosis was supported by history, physical examination, laboratory work, clinical course, and electrocardiogram. The electrokymographic study was made six weeks after the acute attack. The technique of simultaneous electrokymography was employed (described by the authors in previous publications); at least six points on the left ventricular border were studied in each of three positions (posteroanterior, right anterior oblique, and left anterior oblique).

The results were analyzed in the following manner: (1) incidence of abnormal, especially paradoxical pulsations, noted fluoroscopically, (2) incidence of abnormal, especially paradoxical pulsations, noted on electrokymography, (3) types of abnormal pulsations noted on electrokymogram, (4) correlation of incidence of abnormal pulsations on fluoroscopy and electrokymography, and (5) correlation of the electrocardiographic site of infarction and the site of infarction noted on the electrokymogram.

In the anterior wall infarctions fluoroscopy revealed paradoxical pulsations in 19 cases (61 per cent); electrokymography disclosed the abnormal pulsations in the same cases, and in 3 additional cases which were undetected fluoroscopically. The electrocardiographic and electrokymographic localizations of the infarct were in complete agreement in all cases.

Similar results were recorded for the posterior wall and the combined infarcts, except that in these two groups the correlation between the electrocardiographic and electrokymographic localization was poor.

The types of abnormal ventricular pulsations are discussed in detail; in general, they are the "systolic expansion" and "diastolic collapse" patterns. These types and their variations have a similar underlying etiological factor which is related to the varying levels of intraventricular pressures in the cardiac cycle.

Fluoroscopic evidence of abnormal ventricular pulsation was noted in 2 out of every 3 cases, leading the authors to declare that "while there is no doubt that the electrokymograph will detect instances of paradoxical pulsation not seen by even an experienced fluoroscopist, we would like to stress the value of careful cardiac fluoroscopy in finding abnormal ventricular pulsations."

The finding of paradoxical left ventricular pulsations on fluoroscopy or electrokymography does not permit the conclusion that myocardial infarction has occurred, however. In 10 cases of cardiac enlargement due to various causes other than myocardial infarction, paradoxical pulsations were noted, and it is concluded that ischemic, non-infarcted myocardium (in a markedly enlarged heart) may contract abnormally or not at all and result in abnormal pulsations.

Electrokymography is of value in detecting abnormal ventricular pulsations (thus suggesting myocardial infarct) in suspected cases where the electrocardiographic diagnosis is hampered by bundle branch block.—*Harold Fulton, M.D.*

Samet, Philip, Mednick, Henry, and Schwedel, John B. Electrokymographic studies of the relation between the electrical and mechanical events of the cardiac cycle in Wolff-Parkinson-White syndrome. *Am. Heart J.*, Sept., 1950, *40*, 430–446.

The Wolff-Parkinson-White syndrome is a condition in which electrocardiographically there is present a short P-R interval and a prolonged QRS complex. This peculiar time relationship of cardiac activity is believed to be due to an accessory atrioventricular pathway similar to the bundle of Kent. Implicit in this concept of an accessory conduction pathway is pre-excitation, electrically at least, of one ventricle compared to the other. The theory of electrical pre-excitation suggests the possibility of mechanical ventricular asynchronism with the lag in

ventricular contraction and ejection the side opposite the anomalous bundle.

By electrokymography 15 cases of Wolff-Parkinson-White syndrome were carefully studied. Simultaneous records of the ascending aorta (to represent left ventricular contraction) and pulmonary artery (to represent right ventricular contraction) were made. Mechanical asynchronism was found in only 5 cases, but evidence of delay in ejection from both ventricles, regardless of the side of the bundle of Kent, in most instances.—*Harold Fulton, M.D.*

Zinsser, Harry F., Jr., Kay, Calvin F., and Benjamin, J. Malvern, Jr. The electrokymograph; studies in recording fidelity. *Circulation*, Aug., 1950, *2*, 197–204.

The electrokymograph was devised to record the border motions of the heart and great vessels. Although simple in operation, the instrument is complex in principle. In ordinary fluoroscopy, a roentgen-ray beam, pulsating at 120 cycles per second, passes differentially through the thoracic tissues and causes characteristic shadows and translucencies to appear on a fluoroscopic screen. The process of electrokymography interposes another small rectangle of fluoroscopic screen placed perpendicularly to the moving border of the desired objective. The changes in intensity of illumination of this screen are converted by a photomultiplier tube to changes in millivolt output from the tube. These millivolt changes are recorded by an electrocardiograph after passage through an electrical filter. The filter is a complex system of condensers and resistors, designed to eliminate the 120 cycle per second pulsations of the roentgen-ray beam without interfering with the lower frequency changes in fluoroscopic screen illumination.

Preliminary testing of the electrokymograph showed two major classes of errors in recorded amplitude: (1) those concerned with the linearity of the phototube unit, i.e., the deviations from a constant amplitude of response when a standard stimulus is applied to different areas of the fluoroscopic screen, and (2) those concerned with the frequency response of the apparatus, i.e., the deviations from a constant amplitude of response when a standard stimulus is applied at varying frequencies.

In these studies a quantitative analysis of the recording fidelity of three commercial instruments has been made. The linearity characteristics of the phototube receptor slot will probably be found to be essentially similar in all instruments. The time lag and frequency response characteristics vary from instrument to instrument. These are almost entirely contingent upon the characteristics of the filters employed in damping out the cyclic pulsations of the roentgen-ray beam.

It is apparent from these studies that for many of the problems to which the electrokymograph has been and will be applied, an exact measure of the recording characteristics of the specific instrument employed is essential to the accurate interpretation of the results.—*E. J. McDonald, M.D.*

Mednick, Henry, Schwedel, John B., and Samet, Philip. Electrokymographic studies of the normal cardiac cycle. *Circulation*, Aug., 1950, *2*, 250–257.

In the past two decades various attempts have been made to record the heart border, as seen fluoroscopically, with the aid of a photoelectric tube. The most successful device currently in use was developed by Henny and Boone. This consists of a multiplier photoelectric tube with a fluorescent screen activated by the roentgen rays which have passed through the subject being studied. Filters are employed to remove interference created by the roentgen tube. Henny and Boone employed a simultaneous recording of the carotid pulse as a timing device. Luisada and co-workers have used the heart sounds, while Anderson has resorted to the electrocardiogram.

In terms of the cardiac cycle the data may be interpreted as follows: The right auricle contracts about .02 second before the left. After an isometric contraction phase of .04 second the semilunar valves open, with the pulmonary valve about .01 second ahead of the aortic valve. (This may vary from .03 second before to .02 second after.) The systolic ejection phase follows with its duration varying with the pulse rate. After an isometric relaxation phase of .116 second for the left ventricle (varies from .07 to .14 second) the mitral valve opens, with the tricuspid valve opening .025 second ahead of it.

Simultaneous electrokymography offers a practical method for timing the cardiac cycle in normal individuals, and for comparing the sequence of events in the right and left sides of the heart. The shape of the curves obtained varies greatly and conclusions as to typical patterns in heart disease must await further evaluation with large series of patients. Objective statements can be made regarding the direction of the heart borders (as reflected on the tracings) and regarding the sequence of events. This method may prove to be of great value in correlating mechanical and electrical events in the heart especially in the presence of conduction defects.—*E. J. McDonald, M.D.*

Abdomen

Scarinci, Carmelo. Il retropneumoperitoneo. (Nuova metodologia di contrasto degli organi addominali.) (Retropneumoperitoneum; a new contrast method for the abdominal organs.) *Radiol. med.*, Aug., 1950, *36*, 660–664.

The author states that pneumoperitoneum which was introduced in 1918 and perirenal insufflation

which originated three years later have proved to be difficult methods, leading to some fatal complications and therefore they are used only in rare instances.

Recently, French investigators explored the possibility of visualizing the intra-abdominal organs by "retropneumoperitoneum," that is by injecting oxygen behind the peritoneum. In 1948, Ruiz Rivas suggested that the injection be done via the lateral coccygeal route. This method has found limited application in Spain, Argentina and Brazil.

The author describes in detail the technique of a precoccygeal injection. A cleansing enema is given the preceding evening and the morning of the examination. After a prostigmine injection the patient is placed in the knee-chest position. The skin is disinfected with iodine and alcohol and a few cubic centimeters of a local anesthetic are injected around the tip of the coccyx which services as a landmark. For the injection of the oxygen a needle 4 cm. long and 5/10 in diameter (or a simple pneumothorax needle) is used. This is inserted a little obliquely in the anococcygeal line 1 cm. in front of the tip of the coccyx so that in passing upward it strikes the bone. As soon as the bone is touched the needle is straightened out by always feeling the tip of the coccyx. It is necessary to be in contact with the bone so as to inject the oxygen above the anococcygeal raphe which shows no particular resistance to the needle and thus can be estimated only in relation to the coccyx. In pushing the needle another cm. one is certain to be above the anococcygeal raphe. The needle is then connected to a Morelli pneumothorax apparatus and 900–1,200 cc. of oxygen is injected, depending on the size of the patient. When a good visualization of the liver is desired the volume of injected air may be raised to 1,500 cc. It is advisable to feel the perineum during the injection to ascertain that no perineal emphysema is developing which would indicate that the tip of the needle is not above the anococcygeal raphe. This can easily be corrected by pushing the needle another 1 cm. upward.

At the beginning of the injection, the patient has slight pain in the left iliac fossa changing into a more pronounced lumbalgia as the oxygen diffuses retroperitoneally. This is usually relieved after half an hour, although some patients will complain of pain along the right phrenic, especially in the erect position, for twenty-four hours.

The technique presents no particular difficulty so that it can be used also in weakened and cachectic patients. The only possible complication is an accidental puncture of the rectum but this can be prevented by using needles not exceeding 4 cm. in length.

After the injection is completed, the patient is placed in a semi-sitting position for one hour. The roentgenograms are preferably taken in the recumbent position but often additional films with the patient erect are desirable. The method can also be combined with other contrast procedures, such as urography, cholecystography, barium enema, etc. The best roentgenograms are obtained one to two hours after the injection. There is an absorption of the bulk of the oxygen within twenty-four hours and a complete absorption within forty-eight hours.

In the normal person, retropneumoperitoneum permits a good visualization (1) of the two psoas muscles, (2) of the two kidneys, (3) of the liver, in particular its lower border, (4) of the spleen, and (5) in some roentgenograms of the two adrenals. Of the pathologic conditions in which retropneumoperitoneum is of value, the author lists hepatosplenomegaly of doubtful nature, tumors and congenital or acquired anomalies of the kidney, tumors of the adrenal glands and differentiation between hypernephroma of the upper pole of the kidney and an incipient tumor of the spleen.

The conclusion is reached that retropneumoperitoneum via the precoccygeal route is a simple, innocuous procedure embodying the advantages of both the former pneumoperitoneum and perirenal insufflation without their disadvantages.—*T. Leucutia, M.D.*

Meyer, Herbert Willy. Diaphragmatic hernia. *J. Thoracic Surg.*, Aug., 1950, *20*, 235–259.

Until 1920, very few cases of diaphragmatic hernia had been recognized. During the past few years there have been many excellent articles in the literature on diaphragmatic hernia. This is a very good addition to the list of articles mentioned. The subject is dealt with in a scholarly fashion, and the embryology, anatomy, and classification of diaphragmatic hernia are well presented.

Treatment of diaphragmatic hernia is considered and several case reports are included. Technical details of surgical repair of the hernias is discussed and a review of articles on the surgical treatment is presented. This paper might well be considered basic reading material for anyone doing surgery on the diaphragm.—*R. E. Kinzer, M.D.*

Simmons, Eugene E., Long, Robert S., Hunt, Howard B., and Moore, Ralph C. Hiatus hernia; analysis of twenty-five cases. *Arch. Int. Med.*, Aug., 1950, *86*, 253–265.

A report of 25 cases of hiatus hernia with case histories and a discussion of the pathogenesis, frequency and sex distribution indicates that the etiology is not clear cut but a congenital weakness of the diaphragm plus circumstances which greatly increase intra-abdominal pressure is important in their production. They are apparently more common in women and obesity is a contributing factor. Hiatus hernia seems to occur more frequently above the age of fifty years.

The most important symptoms are pain or distress with regurgitation or vomiting, fullness and

anemia occurring in descending but significant frequency. The pain is epigastric or substernal, being more pronounced after meals, and is associated with gas and fullness. This is accompanied by tenderness in the epigastrium.

The roentgen examination is best conducted with the patient rotated obliquely with the right side forward about 30° while drinking thick barium sulfate mixture, preferably with the head lowered.

Treatment is primarily medical. Surgical intervention is rarely indicated or considered in patients who have had serious bleeding, who are disabled by pain or have other complications.

The presence of a hiatus hernia should be considered clinically significant but one should not overlook other pathologic conditions which might produce a similar clinical picture. This is particularly true in cases of so-called functional gastrointestinal disorders, for symptomatically these may well fall into the group of hiatus hernias. As has been stated often before, the acute symptoms of hiatus hernia may also simulate cardiac abnormalities. The writers stress the fact that massive or moderate hematemesis or melena may be due to hiatus hernia and that peptic ulcer may be associated with the condition.—*A. J. Present, M.D.*

Palmer, Walter Lincoln. Certain aspects of benign and malignant gastric ulcer. *Bull. New York Acad. Med.*, Aug., 1950, *26*, 527–537.

The author discusses the role of peptic activity in benign and malignant gastric ulcer. In gastric ulcer the quantity of secretion is not excessive; in fact, it is somewhat less than normal. Some patients likewise have a hypochlorhydria. However, when a patient with gastric ulcer develops complete achlorhydria the ulcer heals and remains healed for the duration of the achlorhydria.

The benign gastric ulcer results from a rather simple process—the inability of the gastric mucosa to withstand peptic digestion. Neoplastic tissue seems to be less resistant to digestion than is normal tissue. Consequently, peptic ulceration may destroy the entire tumor. As a rule, however, only a portion of the tumor is destroyed. Since peptic digestion plays such an important role in producing the morphologic pattern of benign and malignant ulcer, it is to be expected that the lesions may simulate each other clinically.

There is no conclusive proof that neoplastic transformation ever occurs in benign gastric ulcer.

Since the rate of cure in gastric cancer is so low one can support either of two positions: first, that all ulcers should be resected at once in order to remove the possible cancer as soon as possible; or, second, that very little risk is run by studying a given ulcer for a few weeks before urging its removal in order to be certain it is malignant. The author stresses the point that the benignancy of the ulcer must be proved by repeated roentgenologic and gastroscopic observations, otherwise resection is mandatory.—*F. B. Markunas, M.D.*

Maggi, Alberto C., Remolar, Jorge M., and Meeroff, Marcos. Las metástasis óseas en el cáncer de estómago. (Osseous metastasis in cancer of the stomach.) *Prensa méd. argent.*, Aug. 25, 1950, *37*, 1969–1976.

It is calculated that cancer of the stomach is responsible for 4 per cent of deaths of individuals between the ages of forty and sixty. Crámer estimates that 42.8 per cent of the deaths from cancer are due to gastric cancer. In general, one-third of cancers in man and one-fifth of those in women affect the stomach. Copello estimates that "gastric cancer represents 35 per cent of all cancers and the cause of one-third of all the deaths from cancer."

Gastric cancer may extend by direct invasion or infiltration, by lymphatic embolism, by lymphatic penetration, by blood borne embolism, by transplanatation or by metastases to bone. Percentage figures on the occurrence of osseous metastases must be modified by the fact that it is extremely difficult to examine all the bones of the body in the course of autopsy; in fact, the osseous system is frequently forgotten and particular study is given to the bones only when there are evidences of more or less gross alterations of bone. It is generally accepted that 2 to 4 per cent of cases of malignant gastric tumors exhibit metastases in the osseous system.

The authors have reviewed 300 clinical histories of patients with malignant gastric lesions in the Durand Hospital. There was only 1 case of osseous metastasis. To this the authors add a second personal case which they report.

Roentgen examination is most useful in diagnosing these osseous tumors, showing generally much more extensive lesions than could be discovered by the clinical examination. It seems that osseous metastases from gastric cancer, though not frequently encountered, constitute a factor of great significance in the statistics, both clinical and pathologic. The most common method of dissemination is hematogenous, although the venous system may collaborate. The osteolytic type of tumor predominates and often goes on to pathologic fracture.—*J. T. Case, M.D.*

Brown, Charles L. The role of the internist in the detection and early diagnosis of gastric carcinoma. *Radiology*, Aug., 1950, *55*, 165–169.

Methods of arriving at an early diagnosis of gastric carcinoma are discussed with emphasis on the history given by the patient, gastric analysis, roentgen examination of the stomach, gastroscopic ex-

amination and microscopic examination of cells obtained by gastric aspiration.

No symptoms are characteristic of early gastric carcinoma but any disturbance in digestive function of a male over the age of fifty should be thoroughly investigated. Gastric analysis will not yield diagnostic results but is helpful when interpreted in the light of the roentgen diagnosis. The roentgen examination is accurate in at least 90 per cent of the cases detectable by any method.

Gastroscopy is of value when the roentgen examination shows no disease, but cytologic studies must be done by one thoroughly experienced in this field and even then the results have been disappointing because of insufficient accumulation of exfoliated cells and the presence of extraneous cells from the nasal and bronchial mucosa.—*C. A. Stevenson, M.D.*

Hodges, Fred Jenner. Standard radiologic methods used in the search for gastric tumors. *Radiology*, Aug., 1950, *55*, 170–173.

The commonly accepted methods for roentgen examination of the stomach are discussed as part of a symposium on the detection of carcinoma of the stomach. The author emphasizes that both fluoroscopy and roentgenograms are needed and that the physician must assume every stomach he examines harbors some disease process until he rules it out.

Errors of omission occur most frequently when a lesion is present in the cardia of the stomach, while errors of commission occur when the pyloric end of the stomach is not completely normal in its appearance and behavior. In spite of these errors the test is approximately 95 per cent accurate when a carcinoma is present.—*C. A. Stevenson, M.D.*

Gianturco, Cesare. Examination of the stomach by "oil contrast." *Radiology*, Aug., 1950, *55*, 174–177.

A new method is described for obtaining double contrast roentgenograms of the stomach by the use of ordinary barium sulfate aqueous suspension followed by the ingestion of mineral oil. Three ounces of the barium are followed by 3 ounces of the oil. The barium coats the mucosa and the oil, because of its radiolucence, supplies the negative part of the double contrast.

This technique is most efficient for the proximal half of the stomach but at times, by proper positioning, the distal half may be well portrayed.

False impressions may be obtained if there are small air bubbles mixed throughout the barium, large single air bubbles, or isolated drops of barium in the oil. A change in the position of the patient will cause these false shadows to disappear.—*C. A. Stevenson, M.D.*

Stovall, W. D. The histologic characteristics and growth behavior of primary gastric tumors. *Radiology*, Aug., 1950, *55*, 178–183.

This excellent review of the histopathologic appearance and behavior of gastric tumors emphasizes that the metastatic lesions do not always give an adequate clue as to the organ of origin but may even simulate epidermoid carcinoma.

The author agrees with Willis and Ewing that cancer probably develops over a wide area of gastric mucosa and that in the vicinity of a frank tumor there are areas of precancerous changes while portions of the actual tumor may have involved the wall or spread outside of the stomach.

The use of descriptive terms about the histopathologic appearance does not modify the fact of malignancy or tendency to spread.

The same general facts apply to lymphosarcoma. The various cell types have led to the use of distinguishing pathologic names but all are sarcomas.

In a general way, the grading of a tumor gives one an idea of the rapidity of development and the likelihood of early spread.

The actual relationship between gastric ulcer and gastric cancer has not been determined but it is known that ulcer may be a precancerous lesion at times.—*C. A. Stevenson, M.D.*

Moyer, Carl A., and Clayton, S. L. Present status of the surgical treatment of gastric tumors. *Radiology*, Aug., 1950, *55*, 184–192.

The picture of the role of surgery in the treatment of gastric carcinoma throughout the nation as a whole still supports practically all of William Welch's postulates which he stated sixty years ago. Should the resectability and mortality rates be used as factors, the following sets of figures provide the gross picture of gastric cancer in the United States today. Four thousand to 5,000 resections (calculated on a basis of 10 per cent resectability) are performed yearly; 2,000 to 2,500 patients (50 per cent mortality rate) die of the operation, leaving only 2,000 to 2,500 to live out their life expectancy. Of these, approximately 400 to 500 live ten years.

The present status of the surgical treatment of gastric carcinoma in our medical centers is considerably better. Cancer of the stomach develops in about 40,000 to 50,000 persons every year. Should the highest resectability rate reported (80 per cent resectability) be applied throughout the nation, 32,000 to 40,000 resections would be performed with an operative mortality of 1,600 to 2,000 patients (5 per sent operative mortality). This would leave from 30,400 to 38,000 persons to live out their life expectancy and we could expect 6,080 to 7,600 patients to survive ten years.

To bring about this improvement throughout the nation there must be many surgical teams trained in the techniques of extensive resections. Also, the

American physician must adopt the following attitudes toward gastric carcinoma:

1. No patient having an anemia should receive treatment for it until the cause has been established.
2. All physicians must be cancer conscious.
3. Medical therapy of gastric ulcers should be undertaken with the realization that at least 12 per cent of typical peptic ulcers are really cancerous ulcers.
4. Patients with pernicious anemia are much more prone to develop cancer of the stomach than others. Eight per cent of persons having addisonian anemia may be carrying a gastric malignancy. Examination of the stool for occult blood is an absolute must.
5. All polypoid tumors of the stomach are to be considered malignant until proved otherwise.—*E. M. Cooper, M.D.*

Zatzkin, Herbert R., and Riera, Amadeo. Upper gastro-intestinal examination after gastric surgery. *Radiology*, Aug., 1950, *55*, 193–206.

All surgeons should refer their patients in the early postoperative period for roentgenologic review following surgery of the stomach. It is as important to be familiar with satisfactory postoperative situations and the various gastrointestinal surgical techniques as to know the variable limits of normal in persons who have had no abdominal surgery.

The various types of operations involving the stomach are discussed and illustrated in detail.

In the fluoroscopic examination following simple gastroenterostomy the use of a thick paste such as rugar is recommended. As soon as the stoma is identified it is occluded by the direct pressure of the examiner's right hand while the left hand milks the opaque medium into the distal portion of the stomach. After carefully checking the bulb and gastric mucosa, the stoma is examined looking for possible craters, coarsening of the jejunal mucosal folds, and noting presence and position of tenderness. Next, the patient is given a tumbler of a plain barium-water mixture and the length of the afferent loop of the jejunum is determined. This proximal loop may harbor an ulcer, especially if there is a long afferent loop.

A partially resected stomach is examined in much the same fashion as outlined above. Obliteration of the gastric mucosal pattern near the stoma, rigidity of the adjacent stomach wall, and tubular narrowing of the stoma are signs of neoplastic invasion. Wangensteen states that narrowing of the outlet of the distal loop is often due to the surgeon inverting a greater cuff of tissue than advisable. He uses a forked inlying duodenal tube to insure the patency of both the closed proximal loop and the distal loop.

Following esophagogastrostomy the supradiaphragmatic stomach may show minimal or no peristaltic activity whereas the pylorus may be in a state of tonus. The appearance is often bizarre, with the supradiaphragmatic pouch being ragged and irregular, but this should not be interpreted as representing pathologic changes.

Gastro-pancreatico-duodenectomy necessitates discussion with the referring surgeon as to the operative procedure and careful examination of the multiple anastomotic sites.—*E. M. Cooper, M.D.*

Ende, Norman, Daron, Paul B., Richardson, Lyman K., Raider, Louis, and Ziskind, Joseph. Plasma-cell tumor of the stomach; with report of a case. *Radiology*, Aug., 1950, *55*, 207–213.

In a review of the literature, the authors found 2 cases of plasma cell tumor of the stomach. Incomplete information makes it impossible to establish any correlation as to bone marrow findings, urinary Bence-Jones protein, total blood proteins, or albumin-globulin ratio.

The case of a sixty-three year old Negro male is presented. The patient had had pain in the epigastrium for three years. Physical examination revealed a palpable, round, non-tender mass, 3 inches in diameter in the epigastrium. Roentgen examination showed two smooth filling defects. One was along the greater curvature of the distal portion of the stomach and the second along the posterior wall of the greater curvature, just proximal to the previously described defect. The jejunum and transverse colon exhibited evidence of extrinsic pressure due to displacement by the tumor.

A block excision of the lower three-fourths of the stomach was carried out. Twenty-three centimeters of the transverse colon were resected due to involvement of the middle colic vessels. On the third postoperative day radiation therapy was begun. During a thirty day period, a midline dosage of 1,700 r was administered in twenty treatments. Extensive gastrointestinal roentgen studies done three and seven months postoperatively disclosed no evidence of tumor recurrence or spread.—*E. M. Cooper, M.D.*

Allen, Robert P. Cardio-esophageal relaxation; report of three cases. *Radiology*, Aug., 1950, *55*, 214–216.

In 1947, Neuhauser and Berenberg described the syndrome of cardio-esophageal relaxation as a cause of infantile vomiting. They pointed out that the diagnosis is made on the fluoroscopic evidence of non-function of the cardio-esophageal sphincter, dilated esophagus, and lack of the usual diaphragm and stomach contracture in vomiting.

The author presents 3 new cases and an additional roentgen feature as an aid in the diagnosis. This new feature is the absence of the usual amount of intestinal gas.

Treatment is keeping the infant in a semi-upright position. In 1 case, atropinization was found to cause a sharp contraction of the dilated cardia and is suggested as an adjunct in the therapy of cardio-esophageal relaxation.—*E. M. Cooper, M.D.*

Feldman, Maurice. Perforation of peptic ulcer; a roentgenologic consideration of the various forms and uncommon types of perforation. *Radiology*, Aug., 1950, *55*, 217–222.

Perforation complicating peptic ulcer may be classified as follows: (1) into the greater peritoneal cavity, (2) into the lesser peritoneal cavity, (3) retroperitoneal, (4) localized, walled-off perforations, and (5) perforations into other organs. The first group, including progressive and "forme fruste," are well known, the second has practically never been recognized, the third is comparatively rare, and the fifth is usually obvious when another hollow viscus is entered.

The fourth group, localized walled-off perforations, may be subdivided as follows:

(1) Non-sealed chronic perforation into a walled-off pocket which fills with barium.
  (a) forming part of the crater.
  (b) with a pocket at a distance from the crater.
(2) Pinpoint perforation with escape of air only.
  (a) sealed (medical)
  (b) unsealed (surgical)

The first subgroup, where filling with barium is evident, is usually recognized. The second subgroup may be missed. The sealed type presents a small subhepatic air-pocket with a dome shaped superior aspect when an upright film is taken. The air-pocket is often not visualized on routine prone-oblique films. The 5 cases reported to date were from active duodenal ulcers. Pathologically, the adhesions are formed before perforation, localizing the air upon perforation. Since the perforation has since sealed, the air-pocket is rapidly absorbed.

The unsealed or surgical type is essentially the same only there is an associated localized peritonitis, and since the perforation is still patent, the air-pocket remains filled with air. The author believes that this second subgroup is much more common than previously suspected because these air-pockets are seldom seen on the prone films.—*M. B. Goodwin, M.D.*

Dorfman, Milton. Carcinoma associated with diaphragmatic herniation of the stomach. *Radiology*, Aug., 1950, *55*, 254–256.

A polypoid ulcerating carcinoma of the stomach associated with diaphragmatic hernia and occurring in the herniated third of the stomach was diagnosed preoperatively. Microscopically, there was extension to the esophagus. By means of a brief informative table, the author reviews the literature on 35 reported cases of carcinoma associated with diaphragmatic herniation of the stomach, the carcinoma not necessarily being of the stomach.—*M. B. Goodwin, M.D.*

Zárate, E., and Koch, W. Estudio radiológico del intestino delgado. (Roentgen study of the small intestine.) *Rev. méd. de Valparaiso*, Aug., 1950, *3*, 141–149.

The authors base their work chiefly on the recent publication of Walter Naumann of Göttingen. They examined 10 normal individuals and 42 patients with various pathologic findings. In the normal patients the findings were in correspondence with those described by various authors.

Of 10 patients with peritoneal tuberculosis, 9 showed retardation of intestinal transit and lack of tone in the intestinal loops. Six showed disturbance of tonus, causing irregular distribution of the contrast material in patches; in these 6 the mucosal pattern showed very pronounced transverse folds, possibly due to inflammatory edema. Furthermore, there were signs of increase of mucous secretion manifested roentgenologically by the aspect of snow flakes. Further in 4 cases there were signs of an organic lesion in the small bowel and in 3 of them a tuberculous lesion of the cecum.

In 5 cases sent in with a tentative diagnosis of peritoneal metastatic lesions (Hodgkin's disease, sarcoma of the neck and sarcoma of the abdominal wall), there were found only slight functional disturbances which had no definite diagnostic value. In an abdominal fibroid, the origin of which could not be determined accurately even by surgical operation, there was found slowing of the intestinal transit; displacement of the loops toward the left and upward, inclusion by invasion of the terminal ileum and part of the transverse colon. In 1 patient there was an ovarian cyst and also retarded intestinal transit and displacement of the loops.

Various cases of ascites were encountered. In 4 cases there was slowing of the intestinal transit with hypertonicity of the loops; separation and displacement of the loops; floating loops in 2 cases; predominance of transverse mucosal markings. In only 1 case was there found acceleration of intestinal transit. (Naumann found acceleration of the intestinal transit in the majority of his cases of ascites.)

In 5 cases of deficiency syndrome (pellagra, hypoproteinemia, tuberculosis), 4 showed marked retardation of intestinal transit with lowered tonus in the intestinal loops and transverse type of mucosal pattern. In 1 of these, following the examination, liver extract and vitamin B were given with evident improvement of intestinal transit. In only 1 case was marked hypermotility found.

In 3 cases of chronic appendicitis, an appendicular mucocele and 2 cases of pulmonary tuberculosis, sent for examination of the small intestine, the aspect and function of the small intestine was normal.

In 1 case of postoperative paralytic ileus very hypotonic loops were observed, with marked emphasis of the internal mucosal pattern and the transverse markings. There were also zones in which there was retardation of barium with narrowed lumen, thought to be spastic.

In 2 patients with surgical and roentgenologic proof of pyloroduodenal ulcer, the findings corresponded to those of enteritis: acceleration of transit, general or increased hypertonus or hypermotility of the small bowel, and in 1 case alternating zones of increased and decreased intestinal tonus.

One case of enteritis was found, with typical functional signs of hypertonicity and hypermotility, increase of mucus, irregular distribution and puddling of barium, diminution of the intestinal lumen, and some hypertonicity.

In 2 patients with nonspecific plastic peritonitis, there was found retardation of transit, hypotonicity of the intestinal loops, increase of secretion of mucus. The mucosal pattern showed predominantly transverse markings. One case showed morphologic and organic signs of inflammation of the intestinal coils by the peritoneal lesion.

One case had gastric tuberculosis proved histopathologically, together with duodenal ulcer. Nothing pathologic could be found in the intestine or in the peritoneum.

In a case of intestinal parasitosis (ascaris) diagnosed roentgenologically, there was an increase of secretion of mucus in the jejunum and disturbance of tonus but with normal intestinal transit.

A case of gallstones showed hypermotility, hypertonic loops and an increase of transit (in agreement with Naumann).

In psychoneurotics with intestinal upsets there was found retardation of intestinal transit with hypotonicity of the loops.—*J. T. Case, M.D.*

Ravitch, Mark M., and McCune, Robert M., Jr. Intussusception in infants and children. *J. Pediat.* Aug., 1950, *37*, 153–173.

The authors have analyzed the records of 151 children below the age of fifteen years who have had intussusception at the Johns Hopkins Hospital. They found the condition somewhat more common in white than in colored children and definitely more common in male children. Sixty-one per cent of the cases occurred between the ages of four and eleven months. There were two peak periods of the year in which the incidence was high; from March to August, and in December and January. Intussusception tends to affect well-nourished children, and ordinarily "comes out of a clear sky." Ten patients had had previous attacks. Pain, vomiting, and bleeding were the chief complaints.

The surest diagnostic finding is palpation of the intussusception. The mortality rate has shown a progressive decline since 1893 and is directly related to the interval of time between the onset of symptoms and definitive treatment, until ninety-six hours have passed. The authors feel that prompt employment of supportive measures followed by correct specific therapy is more important than a delay of several hours. Various operative procedures are discussed with their resultant mortality rates. The conclusion for their figures is that some form of enterostomy should be performed with or without primary anastomosis.

Ninety-six of the intussusceptions arose in the terminal ilium or at the ileocecal valve. Only 5 per cent of the cases had specific lesions causing the intussusception.

The authors feel that the treatment of choice at the present time is roentgenologically controlled hydrostatic reduction followed by operation, if necessary, to confirm the reduction or if intussusception persists. Their procedure is to insert a Foley catheter with a 45 cc. balloon into the rectum and to distend the balloon. The catheter should not be greased. Firm pressure is made on the buttocks around the catheter. The enema can is elevated 3 feet above the table. The barium runs in under fluoroscopic observation. When the head of the barium column meets the intussusception it becomes concave instead of rounded, forming a meniscus around the intussusception. As pressure increases the meniscus lengthens until the intussusception is forced backwards and the meniscus flattens out. This process is repeated until reduction occurs. It is important to fill several inches of ileum after reduction of the intussusception. If reduction does not occur after a reasonable delay, the patient is allowed to expel the enema which is then repeated. This should not be done more than a total of three fillings. The authors state that they have never failed to reduce the intussusception, at least as far as the cecum.

After the reduction is completed powdered charcoal is given by tube into the stomach and an enema given six hours later to recover the charcoal and confirm the reduction. Reduction is indicated by the following criteria: (1) entrance of barium well into the small bowel, (2) return of the barium with feces or flatus, (3) disappearance of the mass, (4) clinical improvement of the child, (5) recovery in the stool of charcoal administered orally.

The authors have had 32 cases of intussusception treated primarily by barium enema since 1932. In 9 cases surgical intervention to complete the reduction was necessary. All 32 cases survived.—*R. M. Harvey, M.D.*

Dannenberg, Max; Storch, Charles; Sternberg, David; and Hoffman, Charles. High gastrointestinal obstruction in the newborn infant; a radiological interpretation. *J. Pediat.*, Sept., 1950, *37*, 380–386.

Persistent vomiting in the newborn should be considered as due to intestinal obstruction until

proved otherwise. Plain films of the abdomen are the most valuable single aid in the diagnosis of intestinal obstruction.

Gas appears in the small bowel of the newborn infant in one hour and the small bowel is filled with gas in three hours. By twelve hours relatively more gas is present in the colon than in the small bowel.

Obstructions of the duodenum or proximal jejunum show a large gas-distended stomach and occasionally a gas-distended duodenum. Fluid levels may be present depending on feedings and the amount of vomiting. The remaining gut is an airless homogeneous haze.

If the obstruction is incomplete a few gas bubbles may be seen beyond the distended stomach and duodenum. Contrast media are not necessary and may be dangerous. If further localization of the site of obstruction is desired prone and decompression films may be made.

The authors cite illustrative case histories with film reproductions to demonstrate how the diagnosis may be made in various obstructive lesions of the high upper gastrointestinal tract. They make a plea for earlier and more frequent use of abdominal survey films in persistent vomiting of infants.—*R. M. Harvey, M.D.*

Reveno, William S. Intestinal lipodystrophy (Whipple's disease); report of a case. *New England J. Med.*, Aug. 10, 1950, *243*, 216–220.

Intestinal lipodystrophy was first described by Whipple in 1907. Since that time there have been relatively few cases meeting the requirements of arthritis, weight loss, secondary anemia, ankle swelling, cough, dyspnea, diarrhea, abdominal distention, and a palpable mass in the right lower quadrant. Deposits of fat and fatty acid were found in the intestinal wall and mesenteric lymph nodes.

The author's case is reported in detail covering the last two and one-half years of the patient's life and also the autopsy findings. Since the diagnosis was made one year before death the author had the opportunity to make many observations and tests. It was concluded that, since there was no apparent disturbance in preparing the fat for passage into the intestinal mucosa, a defective metabolism in the mucosal cells of the small bowel was the casuative factor.

Roentgen findings of interest in this case were: chest, prominent left ventricle; gastrointestinal tract, clumping and segmentation of the barium in the small bowel and a hypomotility at the four and a half hour study.—*C. W. Cooley, M.D.*

Frazer, A. C. Idiopathic steatorrhoea. *Acta gastro-enterol. belg.*, July–Aug., 1950, *13*, 876–884.

Idiopathic steatorrhoea or the sprue syndrome is found in children suffering from celiac disease and in adults with tropical or non-tropical sprue. The essential characteristic for diagnosis is the disturbance in fat absorption. The sprue syndrome may be a chronic condition with a course running for years. There are periods of incomplete remissions and exacerbations which makes the diagnosis difficult at times. Other sprue-like diseases may be included under the diagnosis of sprue such as gastrocolic fistula.

There are certain differences in the three groups mentioned above. Hematologically in celiac disease there is a microcytic, hypochromic anemia, whereas in the adult type there is a macrocytic, hyperchromic anemia. Tropical sprue may occur in epidemics and may show complete recovery whereas the others do not.

There is a disturbance in absorption of particulate fat in the sprue syndrome resulting in the formation and absorption of fatty acids, delay in emptying of the stomach, decrease in the acidity of the stomach and an increase in mucous secretion. Roentgenographically there is segmentation of barium and hypomotility in the small bowel. The disturbed mechanism of absorption of the particulate fat could be due to interference in the lumen of the small bowel by mucus, some abnormality of the outer membrane of the intestinal cell, faulty transportation through the intestinal cell, or obstruction in the lymphatic pathway.

The signs and symptoms of the sprue syndrome may be placed in three related groups: first, the changes due to faulty fat absorption resulting in increased fat in the feces, absence of postabsorptive systemic hyperlipemia, alteration in gastric function, increased mucus secretion and roentgenographic changes in the small bowel; second, difficulty in absorption of starches and glucose leading to increased bacterial growth in the intestines; and third, as a result of the above, the signs and symptoms of vitamin and other deficiencies develop.—*C. W. Cooley, M.D.*

Grossman, J. W., Fishback, C. F., and Lovelace, W. R., II. Hemorrhage from a Meckel's diverticulum as a cause of melena in infancy; report of a case in which the diverticulum was demonstrated roentgenographically. *Radiology*, Aug., 1950, *55*, 240–243.

The authors report, a case of hemorrhage from a Meckel's diverticulum in a thirteen month old male infant. Several hemorrhages occurred in a five month period. Roentgen examination of the colon was done and the Meckel's diverticulum was visualized on films made after partial evacuation of the barium enema. It was visualized about 2 inches from the ileocecal valve, having the appearance of a tubular segment of intestine wrapped about the ileum.

Surgery confirmed the diagnosis of Meckel's

diverticulum, which measured 3 cm. in length and 2 cm. in diameter, containing gastric mucosa which was superficially ulcerated and bleeding. Recovery was uneventful and there was no subsequent bleeding.—*A. W. Sommer, M.D.*

Greenwood, Frank, and Samuel, Eric. Radiological features of Jackson's membrane. *Brit. J. Radiol.*, Aug., 1950, *23*, 485–489.

The presence of congenital membranes that may invest portions of the intestine constitutes a problem in differential diagnosis for the radiologist. One of these bands, Jackson's membrane, was described in 1913 as crossing the cecum or ascending colon. It is a "thin vascular veil in which long straight, unbranching vessels course, most of which are parallel and take a slightly spiral direction over the colon from the outer upper peritoneal attachment to the inner portion of the gut, ending just above the caput."

One author describes this as very rare, and another claims that it occurs in one-third of cases. It produces some constriction of the ascending colon or cecum, diminishing the lumen to not less than two-thirds of normal. The mucosa may be more complex or may be smoother. With a barium enema there may be ballooning of the colon on each side of the lesion, and this portion of the colon is usually fixed.

This condition is asymptomatic, but it must be differentiated from postoperative adhesions, from inflammatory lesions, such as tuberculosis, amebiasis, actinomycosis, regional enteritis, and from malignant neoplasm.—*E. F. Lang, M.D.*

Gynecology and Obstetrics

Marshak, Richard H., Poole, Charles S., and Goldberger, Morris A. Hysterography and hysterosalpingography; an analysis of 2,500 cases with special emphasis on technique and safety of the procedure. *Surg., Gynec. & Obst.*, Aug., 1950, *91*, 182–192.

A review with follow-up of 2,500 cases studied by means of hysterography and hysterosalpingography is presented. It was found that the complications due to the contrast medium are not serious nor do they cause any permanent harm. When the water soluble medium enters the tubes and peritoneal cavity, pain occurs but this can be readily controlled with demerol. The two water soluble media employed by the authors were skiodan acacia and rayopaque. These quickly absorbed substances do not cause any damage to the tissues and emboli do not occur. Although the authors have not encountered any emboli following the instillation of lipiodol, there are such reports in the literature. Granulomas following the use of lipiodol have also been reported. The water soluble preparations have the disadvantage, because of their quick absorption, of not permitting a twenty-four hour film and, therefore, of not establishing patency in certain cases.

Pelvic inflammatory disease was the most serious complication encountered. This complication was not observed in any patient who had not had a previous history of pelvic inflammatory disease.

Hemorrhage, of short duration, occurred in 2 cases and the uterus was perforated in another case. All pregnancies observed in this series remained intact following hysterosalpingography.

Although the ideal medium for hysterography and hysterosalpingography has not yet been found, complications from any of the substances available are so few that there should be no hesitation in the use of the procedure when it is indicated.—*Mary Frances Vastine, M.D.*

Dyer, Isadore. Clinical evaluation of x-ray pelvimetry; a study of 1,000 patients in private practice. *Am. J. Obst. & Gynec.*, Aug., 1950, *60*, 302–314.

The author concludes that pelvimetry is of value and reliance can be placed on estimation of fetal head size in utero in cephalic presentations. The experience and interest of the roentgenologist is more important than the method employed. In this series the Johnson and Snow method was used for the pelvic measurements and the Ball method for estimation of fetal head size in utero.

Outlet contraction was never found to exist alone but always was associated with mid-plane contraction, the mid-plane contracture being most common. The cephalic pelvic relationship was more important than straight pelvic measurements. A large head with a normal pelvis will deliver as a rule unless a disproportion exceeds −200 cc. The head has a capacity of moulding up to 25 per cent of the estimated volume. A contracted pelvis usually has a smaller baby but if the fetal head is even slightly larger to a difference of −51 cc. the head will not go through as the head of the smaller fetus can only tolerate a small amount of moulding.—*Joseph Levitin, M.D.*

Beresford, O. D., and Aidin, R. Meigs's syndrome. *Lancet*, Aug. 5, 1950, *2*, 211–212.

Beresford and Aidin report a seventy-seven year old patient under observation for four months, with bilateral pleural effusions and ascites. Necropsy revealed an undiagnosed papillary adenocarcinoma of the left ovary. Microscopy of the lung, pleura, and peritoneum gave no evidence of secondary deposits.

Meigs' syndrome commonly refers to fibroma of the ovary associated with ascites and hydrothorax. Ascites and hydrothorax have also been observed with tumors other than fibroma of the ovary, and Meigs has suggested that when these cases formed a

large enough group, they should be included in the syndrome.—*A. A. Brewer, M.D.*

Kaufmann, Louise A., Cuyler, W. Kenneth, and Ross, Robert A. Intraepithelial carcinoma of the cervix. *Surg., Gynec. & Obst.*, Aug., 1950, *91*, 179–181.

Patients with intraepithelial carcinoma of the cervix comprised 0.44 per cent of 10,029 patients who were checked in the Department of Obstetrics and Gynecology at the Duke University School of Medicine and Hospital during the years 1947, 1948, and 1949. Clinically, 4 of these patients were thought to have carcinoma of the cervix, whereas 26 patients were thought to have only benign cervical lesions. The cervices of 10 patients appeared normal.

Thirty-three of the 44 patients with intraepithelial carcinoma of the cervix were under forty-five years of age. Six patients were pregnant. Thirty-eight patients (86.4 per cent) were white.

The fact that the majority of the patients had no clinical signs or symptoms is emphasized as well as the finding that three-fourths of the patients were under forty-five years of age. Experience is required in identifying intraepithelial carcinoma of the cervix. Investigators in this field should be well trained and they should work in close cooperation with conservative pathologists. The pathologic diagnosis of intraepithelial carcinoma of the cervix in pregnant patients presents a problem. It is difficult to distinguish, in smear preparations, the lesion which may regress during the puerperium from the one which will persist as carcinoma in situ.—*Mary Frances Vastine, M.D.*

Pund, Edgar R., and Echols, Joe M. Subclinical carcinoma of cervix uteri; evaluation of endocervical curettage in detection and differential diagnosis of preinvasive and covert invasive carcinoma *J.A.M.A.*, Aug. 5, 1950, *143*, 1226–1228.

A group of 71 cases of subclinical carcinoma of the cervix are presented to show the value of endocervical scrapings in the detection and evaluation of carcinoma of the cervix uteri in its preinvasive phase.

Biopsy alone frequently fails to differentiate a preinvasive carcinoma from an invasive carcinoma. This is especially so when the invasive carcinoma is surrounded by natural surfaces and the entire cervix is not examined. For this reason the authors recommend endocervical curettage in addition to multiple biopsies.

In this series 9 persons' biopsies were negative and the diagnosis was made from endocervical curettings. In 19 patients, all of whom had positive cervical spreads, preinvasive carcinoma was found in the cervical biopsies, but there was no evidence of carcinoma in the endocervical curettings. This is accounted for because there was no invasion beyond the natural surfaces of the cervix.

The authors also feel that routine study of exfoliation cells should be made on all patients prior to hysterectomy. Likewise patients with positive smears should be subjected to multiple biopsies and endocervical curettage.

Seven case histories and three tables are included. —*F. B. Markunas, M.D.*

Walker. A. H. C. Foetus retained in abdomen following uterine rupture. *J. Obst. & Gynaec. Brit. Emp.*, Aug., 1950, *57*, 569–572.

This is a case report dealing with a West African native presenting herself with an abdominal tumor and a history of amenorrhea for three years. This dated from a previous labor which had been complicated by a sudden severe abdominal pain and unconsciousness and resulted in no delivery of a fetus. Laparotomy disclosed a fetus in a fairly good state of preservation with the remnants of the placenta attached to the outer wall of the uterus. The author points out that the lack of hemorrhage at the time of rupture is unusual and the relative freedom from adhesions about the placenta and fetus is also remarkable.—*R. P. Barden, M.D.*

Te Linde, R. W. Urological aspects of gynecology. *Am. J. Obst. & Gynec.*, Aug., 1950, *60*, 273–284.

The author stresses the importance of the gynecologist being grounded in certain aspects of urology. Everett and Sturgis showed that 50 per cent of a group of 100 cases of benign pelvic disease revealed dilatation of the upper urinary tract due to inadequate drainage. These included large fibroids, benign ovarian cysts, pelvic inflammatory disease, complete procidentia and incomplete prolapse with cystocele. In none of the cases of cystocele without prolapse was there urinary involvement. He lists ovarian carcinomas also in this group (these giving ureteral involvement in 60 per cent of the cases) although these can hardly be considered benign. He brings out that even in asymptomatic fibroids ureteral obstruction with upper urinary tract dilatation may occur. Hence an intravenous pyelogram may be indicated before concluding that surgery is not necessary. In 30 per cent of the 100 cases there was distortion of the bladder by pelvic masses. In 26 per cent there was urinary tract infection, and bladder symptoms were present in 46 per cent, indicating that the symptoms in some of these cases were probably on a mechanical basis.

The author briefly discusses the ureteral dilatation occurring in pregnancy. He believes that the mechanical factor of pressure is more important than relaxation due to hormonal factors.

Malignant tumors of the generative organs frequently involve the ureter, the resulting renal

insufficiency being the most common cause of death in carcinoma of the cervix. Everett reported 46 cases of this lesion. In none of the cases in Stages I and II (League of Nations) was there noted any ureteral obstruction. In Stage III this was noted in 57.1 per cent of the cases. All of those cases with such involvement died of carcinoma. This would indicate the grave significance of broad ligament extension of the carcinoma with ureteral obstruction. In 12 of the cases in Stage III showing no obstruction 9 were well after five years, suggesting that the parametrial thickening was probably on an inflammatory rather than a malignant basis. Hence the urologic study may be of value from the prognostic viewpoint.

While the primary erythema after irradiation appears in twenty-four hours and the secondary in three to four weeks after treatment, the more serious tertiary lesions do not usually appear before one year and may occur as late as twelve years. This lesion is the end result of ischemia due to fibrous obliteration of the vesical blood vessels and is usually on or near the trigone. Indolent ulcers first appear and later, if sloughing is severe, a vesicovaginal fistula may result. Cystoscopy with biopsy is necessary to differentiate it from the results of an infiltrating carcinoma. Fibrosis may occur about the ureteral orifices interfering with drainage and impairing renal function. Prophylactic ureteral dilatation with bougies may be of value.

In a study of 43 cases of carcinoma of the cervix treated by irradiation before 1939, all of whom appeared clinically well of carcinoma, Everett found that 48.3 per cent showed some evidence of ureteral obstruction and 54.5 per cent some type of bladder lesion, presumably secondary to the irradiation. Only about 15 per cent of the ureteral and 20 per cent of the bladder symptoms were of serious clinical significance. At a later time one of these patients developed dense ureteral strictures and another a vesicovaginal and a rectovaginal fistula with complete occlusion of one ureter with a large hydronephrosis. As there was no evidence of recurrent carcinoma, the author concludes that irradiation was the etiological factor.

The above cases received an average of 3,000 mg. hr. of radon administered in one hour, most but not all also receiving roentgen therapy. The patients were not anesthetized. Since 1940 the patients have all been treated under anesthesia, enabling better packing of the vagina. Those in Stages I and II have received 4,800 mg. hr. of radium to the cervix in two equally divided doses, two weeks apart. One hundred milligrams of radium were applied for twenty-four hours at each treatment, this being applied intracervically and contracervically. Two weeks after the last treatment, roentgen therapy was begun, 8,000–10,000 r being administered. In the series using this technique there was no demonstrable injury to the urinary tract due to the irradiation. Six per cent developed vesicovaginal fistulas but all these died of carcinoma in five years and the author assumes that the fistulas were secondary to the malignancy rather than to the irradiation. He concludes that with this technique no harm results to the urinary tract.

The author briefly discusses diverticulum of the urethra, which in some cases is secondary to a suburethral abscess but in other cases apparently does not have an inflammatory origin. There is a bulge in the suburethral area simulating a urethrocele. The diagnosis is confirmed by catheterization of the diverticulum through the urethra with injection of radiopaque material and roentgenogram. Discussion follows concerning the treatment of the lesion, this being surgical.—*J. P. Bennett, M.D.*

Genitourinary System

Matthei, L. P. Improved pediatric excretory urography. *J. Urol.*, Aug., 1950, *64*, 417–420.

Intravenous urography is very important in the detection of pathological conditions of the urinary tract, especially in children. The presence of intestinal gas shadows may be very confusing in this age group in the interpretation of urograms, and this may be responsible for the tendency not to employ this valuable procedure in this group. The author quotes numerous authorities on this subject to emphasize the universality of this difficult problem.

Through an error in preparation of one of the author's young subjects for urography, the patient was fed an 8 ounce formula before being brought to the roentgen department. To the author's surprise the kidneys were very well visualized through the distended stomach. He now dehydrates all infants and small children for twelve hours before urography. As soon as the dye has been injected, 8 ounces of formula is offered to the infant or 8 ounces of milk to an older child. This results in a more contented child and at the same time, according to the author, the dilated stomach permits clear visualization of the kidney area by displacing the overlying intestines.

The author has not found that the ingested fluid interferes with the concentration of the dye. He includes reproductions of illustrative films to demonstrate the efficacy of the method.—*R. M. Harvey, M.D.*

Danzer, Joseph T. Spontaneous pneumaturia; with report of a case. *Radiology*, Aug., 1950, *55*, 244–246.

Pneumaturia, the appearance of gas in the bladder, may occur in several different ways: (1) as a result of injection of air for diagnostic purposes; (2) by introduction of air through a puncture wound of the bladder or an operative procedure; (3) as a result of a vesicovaginal or vesico-intestinal fistula; (4) by manufacture of gas in the bladder itself.

Spontaneous pneumaturia is rare, with only about 30 cases reported in the literature. A high percentage of the recorded cases have been in diabetics, probably due to the presence of strains of bacteria capable of forming gas from sugar.

The author reports a case of pneumaturia occurring in a diabetic female, aged sixty-two, with abdominal distention. The distended, air-filled bladder was visualized on anteroposterior and lateral films of the abdomen.—*A. W. Sommer, M.D.*

Hurwitz, Alfred, and Albertson, Horace A. Cervical osteomyelitis and urinary-tract infection caused by Escherichia coli. *New England J. Med.*, Oct. 12, 1950, *243*, 562–563.

A case report of cervical osteomyelitis secondary to urinary tract infection with *Escherichia coli* is presented. A review of the literature reveals only several other cases of vertebral osteomyelitis which was proved to be secondary to urinary tract infection.

The present case occurred in a fifty-five year old male who had been under treatment for pyelonephritis. Urine cultures had revealed *Esch. coli* organisms. The patient complained of severe pain in the neck radiating down the shoulders and difficulty in swallowing. There was limitation of movement of the neck and tenderness on palpation. Roentgenograms revealed extensive destruction of the anterior bodies of the third, fourth, fifth, and sixth cervical vertebrae with destruction of the discs and increase in the retropharyngeal and retroesophageal spaces. The abscess was drained and cultures of the pus revealed *Esch. coli* only. The osteomyelitis did not respond to penicillin or streptomycin therapy, but subsided after drainage and immobilization. The urinary tract infection was also resistant to antibiotics, but improved following correction of bladder neck obstruction.—*W. M. Roy, M.D.*

Carlson, Hjalmar E. Supernumerary kidney; a summary of fifty-one reported cases. *J. Urol.*, Aug., 1950, *64*, 224–229.

The author reviews the literature and reports the 51st case of true supernumerary kidney. Only 4 cases were diagnosed preoperatively. Since the supernumerary kidney usually excretes little dye, intravenous urography and kidney function tests are of little value in the diagnosis. A bifid ureter is usually present which makes the diagnosis by retrograde pyelography difficult.

Supernumerary kidneys are usually at a lower level than non-supernumerary kidneys and are usually smaller. Ectopic ureters are common. Supernumerary kidneys are subject to all the the diseases of non-supernumerary kidneys. The author lists all the pathological changes which have been present in the 51 cases reported. He reports a case in which both the normal and supernumerary kidneys were the seat of renal carcinoma.—*R. M. Harvey, M.D.*

Prather, George C. Differential diagnosis between renal tumor and renal cyst. *J. Urol.*, Aug., 1950, *64*, 193–199.

The author considers the various means by which a differential diagnosis can be made between renal cyst and tumor. As far as the history is concerned, pain and bleeding are more suggestive of tumor. Both lesions may cause pressure symptoms from their mass and it is seldom possible to differentiate by palpation between the two lesions. A low grade fever favors the diagnosis of tumor. The only laboratory test of value is the Papanicolaou test for tumor cells in the urine.

As far as roentgen diagnosis is concerned, calcification is only found in the rarer types of cysts and its presence favors the diagnosis of malignancy. The deformity of the renal pelvis and calyces due to cyst or tumor is much the same on intravenous or retrograde pyelography. The author concludes that with accumulated experience one gets less dogmatic in making a differential diagnosis between the two entities from pyelographic data.

In the final analysis it must be concluded that in the great majority of cases surgical exploration is essential to make a differential diagnosis between renal cyst and renal tumor.—*R. M. Harvey, M.D.*

Boyd, R. Wallace. Adrenal neuroblastoma. *Canad. M.A.J.*, Aug., 1950, *63*, 153–157.

The author reviews 6 cases of adrenal neuroblastoma which were admitted to the Vancouver General Hospital from 1945 to 1948. The patients were five years of age or under, which is to be expected since the tumor develops from the primitive neuroblast of the adrenal medulla. The admission diagnoses were variable because of the tendency of the early manifestations of the tumor to mimic symptoms of other diseases. All patients presented a large, palpable, right or left upper abdominal mass, at or soon after admission. Roentgen studies were very helpful in establishing the intra-abdominal relationship and origin of the tumors. Calcified areas develop in neuroblastomas subsequent to hemorrhage and necrosis, and are then visible above the kidney shadows. Intravenous urography may demonstrate downward displacement of the kidney by a mass. A barium meal may show that the stomach is displaced by a mass arising posteriorly. Skeletal roentgenograms may reveal the characteristic moth-eaten destruction of metastatic lesions. The author points out that there is no justification for the continued use of the terms "Hutchinson and Pepper types" on the basis of distribution of metastases.

Roentgen therapy caused the tumor to decrease in size or even to disappear in four to six weeks.

However, improvement in the general condition of the patients was only temporary, and none survived longer than eight months from the onset of the first symptom.—*C. L. Hinkel, M.D.*

Koffler, Irving; Buck, Gray; Wingard, Christian; Hitchcock, Philip; Guthrie, Robert; and Teague, R. S. A case of pheochromocytoma; diagnosis by the benzodioxane test, urinary hormone studies, and nor-epinephrine assay of the tumor. *J. Clin. Endocrinol.*, Aug., 1950, *10*, 897–909.

A case of pheochromocytoma is presented in a Negro male who at the age of twelve showed symptoms of sustained hypertension with cardiac enlargement, retinal hemorrhages, renal insufficiency, and hypertensive encephalopathy. Symptoms were gradually progressive over a two year period until the patient sustained a cerebral accident at the age of fifteen years. Diagnosis was made by means of the benzodioxane test. On exploration a tumor of the right adrenal medulla was found and removed with relief of the symptoms. Studies of urinary cortin, 17-ketosteroid and gonadotropin levels are presented both before and after removal of the tumor.—*L. K. Sycamore, M.D.*

Skeletal System

Solomon, Walter M., and Stecher, Robert M. Chronic absorptive arthritis or opera-glass hand; report of eight cases. *Ann. Rheumat. Dis.*, Sept., 1950, *9*, 209–220.

Opera-glass hand, "la main en lorgnette," has been described as a very rare condition. The present paper calls attention to reports of the same disorder under a variety of names and describes 8 additional cases from the author's experience.

Marie and Léri (1913) described the case of a woman aged sixty-six who had had severe generalized rheumatoid arthritis for twenty-eight years. Photographs of the hands showed that the fingers and wrists were shortened and contracted and the skin wrinkled, redundant and thrown into transverse folds, giving the impression that the phalanges were retracted one into the other like an opera glass. Dissection revealed that the phalanges had lost their normal shape, the regular cylinders had become irregular truncated cones, the articular ends had completely disappeared. These changes had been seen on a roentgenogram which showed similar absorption of bone at the distal ends of the radii, ulnae, carpals, and metacarpals, and marked radiolucence of all the bones. Microscopic examination showed massive degeneration of bones, cartilage, and muscles, sparing the blood vessels, nerves and tendons. The authors mentioned another patient with a similar deformity limited to one finger.

The literature also disclosed several cases showing extensive absorption of bone which have been called psoriatic arthritis, arthritis mutilans, and arthritis absorbans.

The authors describe 8 cases including 5 women and 3 men. Age of onset of the disease ranges from fifteen to thirty-five years. Severe absorptive changes were noted as early as three years after onset and have persisted as long as forty-two years.

The onset of the disease of these patients was typical of rheumatoid arthritis with a course of the more malignant type, 6 patients becoming bedridden and practically helpless in a relatively short time.

Photographs and roentgenograms of the hands of all these patients showed changes similar to those described by Marie and Léri.

In contrast to the usual findings of rheumatoid arthritis, most of the finger joints of the patients with this type of arthritis had an abnormal range of motion in all directions and there was another striking feature in the ability of the fingers to elongate like a telescope when pulled out; the skin was loose, wrinkled and thickened. Yet the process was confined to one or two anatomical regions, with the other joints showing the characteristic changes of rheumatoid arthritis. Two patients showed changes of the fingernails and skin suggestive of psoriasis.—*A. B. Smith, M.D.*

Fitzgerald, H. Walden. Bilateral perilunar dislocation of the carpus; report of a case. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 386–387.

Perilunar dislocation of the carpus is an unusual injury of the wrist joint and a bilateral case is so rare, the author believes, that it is worthy of report. In this injury the lunate bone remains in normal relationship with the radius but the other carpal bones and the rest of the hand are displaced backward, usually to the radial side. The tip of the radial styloid process is sometimes fractured and displaced with the carpus, and the tip of the ulnar styloid also may be avulsed. Reduction is achieved by simple traction and manipulation and the wrist is immobilized in plaster for three or four weeks. The author's patient, three years after the injury, had for all practical purposes full return of the function of the left wrist and roentgen examination showed no residual damage. In the right wrist, there was slight limitation of the extremes of movement but the roentgen examination showed a normal appearance of the carpal bones.—*R. S. Bromer, M.D.*

Jeffery, C. C. Fractures of the head of the radius in children. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 314–324.

The cases studied in this paper consist of two groups of fractures of the head of the radius in children. In group 1 (22 cases) there was lateral tilting

of the head by 30° or more, caused by fracture-separation of the epiphysis or greenstick fracture of the neck with angulation. In group 2 (2 cases) there was backward rotation of the head through 90°.

The author concludes that full recovery after fracture of the head of the radius in children may be expected in cases with tilting of the radial head from 30 to 60° whether treated by early manipulative or by operative reduction.

Manipulative reduction is facilitated by knowledge of the direction of displacement and tilting of the radial head, which can be determined by the study of appropriate roentgenograms.

When the upper radial epiphysis is completely displaced from the shaft, some permanent loss of movement is to be anticipated even when accurate reduction has been secured by operation. Early fusion and some deformity of the radial head are also to be expected. This is not surprising in view of the risk to the blood supply of the displaced head, particularly in those cases treated by operative reduction.—*R. S. Bromer, M.D.*

Roberts, Norman, and Hughes, Rowland. Osteochondritis dissecans of the elbow joint; clinical study. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 348–360.

In reviewing the records of over 90 unselected cases of loose body in the elbow joint, the authors found that arthrotomy for loose body was more frequently performed on the elbow than on the knee. This was also the case in study of the records of twenty years at Liverpool Royal Infirmary. The age of onset, sex incidence, and symptoms are described. The most constant early signs are limitation of extension of the elbow and palpable enlargement of the head of the radius. The absence of conspicuous synovial swelling distinguishes the condition from chronic infective lesions, particularly tuberculosis.

In regard to the roentgenographic appearances, the so-called typical appearance of subchondral bone surrounded by a zone of rarefaction, which is so often seen in the knee, hip and ankle is rarely seen in the elbow. In the authors' experience, the earliest changes are seen in the anteroposterior roentgenogram as a patchy rarefaction with ill-defined limits, largely affecting the convexity of the capitellum. The next most constant appearance is an irregular cyst-like change which has been aptly likened to a series of signet rings of different sizes opening into the focus bed. The shedding of multiple small fragments giving a ragged appearance is sometimes seen. A single, large, rarefied or punched-out area or cavity without any apparent sequestrum may also occur, closely simulating the destruction of tuberculosis. Sometimes a loose fragment of bone is seen to lie close to its capitellar bed. In 2 patients in whom the major change was in the capitellum, irregularity and cyst-like changes were also observed in the head of the radius.

Whatever the original form of the lesion may have been, in the vast majority of cases showing loose bodies, careful examination of the roentgenograms will reveal scars which are characteristic of previous osteochondritis. The cyst-like appearance may remain, or the eburnated irregular margins of the primary lesion may be seen in profile, but the most constant feature of all is a flattening of the capitellum. Secondary osteoarthritis commonly develops at a later age and may be wrongly regarded as the cause rather than the result of the loose bodies. If the osteoarthritic changes are severe it may be difficult to distinguish between a primary osteoarthritis and one secondary to a previously undetected osteochondritis dissecans. In severe cases, the greater sigmoid cavity of the ulna may be enlarged and deepened with a curious angular appearance.

Associated changes may be enlargement of the head of the radius and premature epiphyseal fusion. Bilateral involvement of the elbows may also occur. In the cases studied no hereditary factor could be found.

In the review of the literature, the authors found that the opinion was against early operative intervention. At later stages, the indication for surgery becomes more definite. The loose bodies have become detached and there are good reasons for their removal.—*R. S. Bromer, M.D.*

Hucherson, Denman C. Ainhum (dactylolysis spontanea); a review of ten cases. *Ann. Surg.*, Aug., 1950, *132*, 312–314.

Ten cases of ainhum are reviewed. This condition is of unknown etiology. It is characterized by (1) occurring only in Negroes, (2) by a constricting band of scar tissue developing about the fifth toe, (3) this eventually leads to the absorption of the bone of the phalanx, (4) severe pain during the latter stages.

The condition is cured by amputation.—*J. H. Harris, M.D.*

Abel, Martin S. Sacroiliac joint changes in traumatic paraplegics. *Radiology*, Aug., 1950, *55*, 235–239.

In a roentgenographic survey of the pelvic area in 160 paraplegics two main groups of abnormalities were found: (1) the so-called para-osteo-arthropathies; (2) true arthropathic changes in the sacroiliac joints. Ninety-eight, or about 61 per cent, of the cases, showed abnormalities of the sacroliac joints roentgenographically.

The changes varied from minimal para-articular rarefaction and narrowing of the joints to apparent complete bony fusion. The sacroiliac films were, in many cases, quite suggestive of the Marie-Strümpell type of rheumatoid arthritis. It is possible that the

factors responsible for the fusion in this disease may also be operative in paraplegia.

No statistically significant correlation could be established between the presence or extent of the joint lesions and the site of injury, level of cord transection, duration of disability, age of the patient, presence of para-osteo-arthropathies, or other clinical findings.—*A. W. Sommer, M.D.*

Hofmann, Arnold. Die Bedeutung der Röntgendiagnostik für die operative Behandlung des Bandscheiben-Prolapses. (The importance of the roentgen diagnosis in the operative treatment of disc prolapses.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, Aug., 1950, *73*, 442–453.

The author correlates the surgical findings with the roentgen findings in 350 cases. The various types of prolapse are divided into: (1) pure nucleus pulposus prolapse, in which only the nucleus pulposus prolapses, and (2) the disc prolapse, in which, in addition to the nucleus pulposus, major parts of the annulus fibrosus prolapse.

These are subdivided into: (a) temporary prolapse, (b) complete prolapse, and (c) ossification or calcification of prolapsed discs.

In the large group of complete prolapse there are those which are incarcerated and those which are separated from the rest of the disc. Some prolapsed discs may be in an atypical position if the fragment migrated from the original point of prolapse. In rare cases, a detached prolapse may even migrate to the posterior aspect of the dura. Group (c) prolapses may be serious if they occur in the cervical or thoracic spine.

Prolapses in the cervical and thoracic spine are very rare. The history and physical findings are discussed. Myelographic sources of error may be the "waist" phenomenon (bilateral narrowing of the column of contrast material) and the "cuff" phenomenon (alternating smooth filling defects on both sides at adjacent levels). These are due to ligamentous or osseous changes.

In some cases the myelogram would indicate prolapse in one space while the disc was found in space which appeared normal. In others, a prolapse was found although the myelograms were negative or only suspicious. Due to narrowing of the dural sac at the lower levels, a laterally situated prolapse may not be demonstrated. In a few cases nothing was found on surgery in the presence of a positive myelogram. Narrowing of the intervertebral space is not a reliable sign of prolapsed disc.

Attention is directed to the compression of nerves by bony spurs of the vertebral bodies and ossified or calcified ligaments.

The various contrast materials are discussed. The author prefers abrodil and describes the technique of its administration.—*F. M. Reis, M.D.*

Armstrong, J. R., Golding, F. C., Gillespie, H. W., and Freedman, B. Discussion on the significance of congenital abnormalities of the lumbosacral region. *Proc. Roy. Soc. Med.*, Aug., 1950, *43*, 635–640.

J. R. Armstrong. Among the possible causes of low back pain are the developmental anomalies or variations of normal which are common in the lumbosacral region. Although these anomalies are found mainly in roentgenograms of persons with low back pain, they are also commonly found in patients who have no low back pain.

Five general classifications of lumbosacral anomalies are offered:

(1) Failures of posterior fusion: Failure of posterior fusion produces spina bifida. This bony anomaly alone is not significant and only assumes importance in association with abnormalities of meninges, cord or cauda.

(2) Spondylolysis and spondylolisthesis: Spondylolisthesis is an undoubted cause for symptoms which may be early or late, mild or severe. They are commonly found in association with a disc lesion at the interspace immediately above or below the spondylolisthesis.

(3) Abnormalities in number of mobile vertebrae in the lumbar region: Commonly 4 or 6 mobile vertebrae may be found. This appearance may be false due to abnormalities of the lower rib. The presence of 4 or 6 mobile vertebrae in itself is not significant, but the spine with 6 mobile vertebrae may be more subject to postural strains. Partial sacralization of the last free vertebra may produce symptoms. If incompletely fused, a false joint may be formed and arthritis may occur producing symptoms. Moreover, the 4th or 5th lumbar root, depending on the level of the vertebra involved, can be in close anterior contact with such a joint and may be irritated by arthritic change.

(4) Abnormalities of the plane of articular facets: Variations, either bilateral or unilateral, are very common. These variations are not considered an important cause of low back pain. Arthritic changes of the facets that are associated with sciatica are almost invariably secondary to a disc lesion at the same level and this lesion accounts for the symptom complex.

(5) Congenital abnormalities in the discs themselves: Evidence does not support the contention that disc lesions are attributable to congenital defects of the disc proper.

F. Campbell Golding. Little is known of the clinical importance or mode of formation of some of the anomalies of the lumbosacral spine. Many of its lesions appear due to the combination of trauma, degeneration and congenital anomaly.

Spina bifida of the first sacral is relatively common. It was found in 19 per cent of films of the sacral

spine of 100 consecutive adult patients at the Middlesex Hospital.

Three roentgenological reasons why unilateral sacralization of a transitional vertebra may cause symptoms are: (1) It may form a false joint and the margins of this joint are often sclerosed with local lipping. (2) A local scoliosis may develop. (3) Protrusion of the disc above the site of the sacralization is not uncommon.

Roentgenological evidence of a narrowed lumbosacral disc is of no practical value when accompanied by sacralization because this disc is variable in width. A narrowed lumbosacral disc is a common congenital anomaly. Lateral films of 44 of 100 patients sent for barium enema showed relative narrowing of the disc.

There are many examples of protrusion of the nucleus of the disc into the vertebral body. In adolescents it is seen in osteochondritis of the spine and in a rare condition when the epiphyses are unaffected. In adults the condition is known as Schmorl's node. The Schmorl's node may be due to congenital weakness or to degeneration of the disc plate with the minor traumas of daily life the ultimate factor.

Gas shadows in some part of the disc are present more often than suspected. They are seen only in the lateral view and are often thought to be air in the colon. They are seen only when the patient reclines. Probably such gas shadows are evidence of disc degeneration.

Calcified discs do not appear to be a causative agent of symptoms.

Impaction of the spinous processes on one another in the lordotic patient is a possible source of low back pain.

It has not been determined whether the hiatus in the pars interarticularis (spondylolysis) is of congenital or traumatic origin. Probably the cause of symptoms in spondylolysis and spondylolisthesis is abnormal motility of the vertebrae. This abnormal motility can be demonstrated by lateral films taken in full flexion and full extention in the upright position.

H. W. Gillespie. A series of 500 patients on whom laminectomies for disc protrusion were performed showed an incidence of 34 per cent of lumbosacral abnormalities. A series of 500 normal spines showed only 8.8 per cent abnormalities in the lumbosacral region.

B. Freedman. Complete or partial absence of the sacrococcyx is a rare anomaly. In all cases of congenital deformity of the lower limbs, of the genitourinary system, or the anorectal region a roentgenogram of the sacrococcygeal region should be obtained because of the possible association of these congenital defects. —*D. R. Bernhardt, M.D.*

Macnab, Ian. Spondylolisthesis with an intact neural arch—the so-called pseudo-spondylolisthesis. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 325–333.

Spondylolisthesis without a defect in the neural arch, the "pseudospondylolisthesis" of Junghanns, usually affects the fourth lumbar vertebra. The essential lesion is an increase in the angle between the inferior facets and the pedicles which allows subluxation at the inferior joints. The forward displacement is less than 1 cm.

Macnab states that there is no recorded instance of a patient with a roentgenologically normal spine who subsequently developed this condition. Any statement as to etiology must therefore be a matter of conjecture based on the findings of and progress of established cases. Normally the plane of the inferior articular facet is at right angles to the pedicles and over-riding is virtually impossible. Junghanns, however, pointed out that in his specimens of "psuedospondylolisthesis" the angle between the pedicle and the inferior articular facet approached 180°. This alteration in angle between the pedicle and the inferior articular facet may be one of many congenital anomalies found in this region. This is the essential lesion and, when present, the anterior dislocating force is resisted only by the soft tissues and mainly by the intervetebral disc. It may be supposed that the abnormal strain eventually causes disc degeneration which leads to an alteration in the axis of the flexion and extension of the adjacent vertebrae. Flexion and extension movements cause rocking at these joints. This abnormal movement probably accounts for the gross osteoarthritis of the posterior joints seen in the later stages of the condition.

The condition produces a clinical picture of backache and sciatica, but may also present a "drop foot," and in unusual instances compression of the cauda equina may occur. Patients seen in the early stages without signs of root compression are best treated according to Macnab by localized spinal fusion. Late fusion may afford no relief because of secondary changes in the spine, but these patients obtain some relief from a corset. Laminectomy is indicated for severe symptoms in patients who show signs of nerve root compression and it should be followed by spinal fusion.—*R. S. Bromer, M.D.*

Wilkinson, M. C. Pregnancy and skeletal tuberculosis. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 307–313.

This paper is based on a study of case histories of 132 women with various kinds of skeletal tuberculosis. Some details of 32 women are given according to the situation of the skeletal lesion. These 32 women had 45 children. There were 14 who had spinal tuberculosis, 5 who had hip tuberculosis, 7 had tuberculosis of the knee, 2 with tuberculosis of the sacroiliac joint and 4 with involvement of the shoulder, foot or wrist.

The author believes that his study shows that no serious harmful effects have been caused by pregnancies going to full term in these patients with skeletal involvement. He found it difficult to determine whether the onset of skeletal tuberculosis soon after pregnancy may be attributed to the pregnancy. There would appear to be good grounds for reassuring the married woman who has suffered from skeletal tuberculosis regarding the prospect of normal pregnancy.—*R. S. Bromer, M.D.*

Seghini, Giuseppe. La tubercolosi del cingolo pelvico anteriore (pube ed ischio) nell'infanzia e nel periodo prepubere. (Tuberculosis of the anterior pelvic girdle [pubis and ischium] in childhood and prepuberty period.) *Arch. di chir. ortop. e di med.*, July-Aug., 1950, 358–397.

The rarity of this lesion is common knowledge. A review of the literature (Broca, Peermans, Kavka, Pytel, Valtancoli, Fiorini, Rebaudi, Mancini, Marconi, Mezzari, etc.) places the frequency of pubic tuberculosis at 0.3 per cent and of the ischial tuberculosis at 0.34 per cent. The corresponding figures at the author's institute are: 0.34 per cent for the pubis and 0.14 per cent for the ischium.

The embryology of the pelvic bones is briefly considered.

The pathogenesis of tuberculosis in the adult and prepuberty period is discussed, localizing the affection to the secondary points of ossification in the adult and the primary points of ossification in the young. The infection most likely occurs by means of an embolus from any source. The known influence of growing bone, greater blood supply, osteoformative activity, trauma, familial predisposition and allergy are mentioned in the pathogenesis.

The age incidence varies from six to fifteen years with the greatest frequency in the eight to eleven year bracket. The lesion predominates in the male sex, the ratio being 3:1.

The roentgenograms show small cystic-like areas with reactive border typical of a granuloma reaction if the lesion is small and localized, vacuolization and sequestra formation with preservation of the corticalis if the lesion is more extensive, and complete destruction of the bone encased in a periosteal cuff if the lesion is far advanced. The sequestration is extremely rare in ischial tuberculosis. In general, the more recent and virulent the involvement, the greater the decalcification and, conversely, the more chronic and fistulized the involvement, the greater the increase in the calcium density.

In tuberculosis of the pubic bone small necrotic foci intermingled with areas of atrophy are frequently seen. If the process is located in the symphysis, marginal bone destruction with sequestra formation constitutes the predominating feature. In case of extension to the horizontal and descending rami the destroyed areas are surrounded by perifocal zones of increased density or atrophy.

The essential symptoms are localizing point of tenderness, pain to the homolateral joint, asymptomatic localized tumefaction, contracture of muscle groups, characteristic gait for relief of pain, polyuria, etc.

The reader is referred to the article for the exhaustive table and diagrams illustrating the sites of presenting abscesses.

The differential diagnosis includes: osteomyelitis, osteochondritis, skeletal lipoidosis, eosinophilic granuloma, solitary myeloma and sarcoma.

The prognosis with antibiotics, rest, surgical drainage and excision remains favorable.—*N. M. Albanese, M.D.*

Kolb, Oskar. Nachuntersuchungen an genagelten Schenkelhalsfrakturen. (Follow-up studies on nailed fractures of the femoral neck.) *Chirurg*, Aug., 1950, *21*, 467–473.

Follow-up studies were made in 24 out of 82 cases of hip nailings. The results were good in 10, bad in 12 (9 of which had irreparable damage to the femoral head), and two patients developed late arthrosis.

The end results are influenced by:

1. *Nutrition of the femoral head.* The prognosis is dependent upon the age of the patient, medial or lateral site of the fracture, and displacement of the fragments as shown by films taken in two directions before any attempt at restoration of position.

2. *Statics of fracture.* The inclination of the fracture plane is most accurately estimated by a film of the entire pelvis, which furnishes a true horizontal base line. Exact reposition of the fragments is important, because, even though it may not restore the blood supply to the head, it will at least provide optimal conditions for endosteal callus formation. Bumiller states that in cases with a vertical fracture plane (90°), the inclination of the nail should be 45°, increasing as the angle of the fracture plane decreases, so that at a 50° angulation of the fracture, that of the nail should be about 65°. Although the anatomy limits the angulation of the nail from 45° to 60°, the optimum angulation of the nail to the fracture plane is less important in cases with lesser angulation of the fracture plane, because the shearing forces are decreased and the compressing forces are increased. The secure fastening of the fractured surfaces is of the greatest importance.

3. *Technical errors.* Entrance of the nail into the joint space or the acetabulum is apparently not too important if it is withdrawn later. Goetz deliberately drives the nail into the acetabulum in heavy patients.

The group of good results, despite the fact that most were medial fractures, occurred because there was insufficient displacement to greatly disrupt the

blood supply of the head. The inclination of the fracture plane was always under 50°, so that the angulation of the nail was not too important. Some of them had technical errors, such as the nail being driven into the acetabulum, or the head not being securely fixed, and in one case the nail became loose, necessitating a second nailing.

The bad results fell into three groups:

1. *Necrosis of the head.* It was associated with marked displacement of the fragments. All but one case had a fracture angle of 40°. One had rust damage from an intra-articular nail. In all cases the fracture healed, and there was a symptom-free period of up to, but not over, two years, but the vascularization of the head was incomplete.

2. *Late arthrosis.* This was manifested by areas of increased and decreased density in the femoral head, and was attributed to disturbed vascularization, and was seen in two patients at six and seven years after the injury.

3. *Partial necrosis of the head.* Most cases started out well, with good repositioning of the fragments. The angle of the fracture plane was usually over 50°. In every case the entrance angle of the nail was too little, producing a loss of up to 50 per cent of the compression force. Every fracture showed an adduction tendency after nailing. The mechanism is that weight bearing produces compression only of that part of the fracture below the nail, with tension above it, thus disturbing the vascular supply to the upper and outer portion of the femoral head, with the production of partial necrosis in an average of one and a half to two years. The damage, usually irreparable, is attributed to added injury brought on by too early weight bearing. However, one case was cited in which the diagnosis was made early, and solid union occurred after five months of rest.

The author concludes that a period of two to four weeks' rest, in a fracture which must be observed for at least two years to be sure that healing is sound, is not enough, and recommends three to six months without weight bearing and two years of roentgenographic control, because damage was usually irreparable by the time subjective symptoms had occurred. He does not yet know whether early diagnosis of beginning necrosis of the head, followed by prolonged bed rest and abstention from weight bearing, may arrest the process before complete destruction of the head occurs.—*J. J. B. Light, M.D.*

Robson, P. N. A large calcified lipoma of the thigh, report of a case. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 384–385.

The case reported is that of man, aged eighty-one, who had a large swelling of the left thigh which had been present for twenty-one years. Roentgenograms showed a large soft tissue swelling round the lower two-thirds of the femur with areas of calcification. There was no evidence of active bone formation or destruction but there was a suggestion of pressure atrophy of the cortex of the femur just above the medial condyle. The appearance was that of calcification in a benign tumor such as a lipoma.

Before amputation there was venous congestion and edema of the limb below the swelling, with early destruction at the base of the fifth toe. Pulsation of the posterior tibial and dorsalis pedis artery could not be felt. Pathological examination showed a lipoma, weighing 5,200 grams and measuring 18 cm. in diameter. There was no evidence of malignant change and the bone of the femur appeared normal.

The author believes that the tumor was a lipoma which had recurred after incomplete removal twenty years before operation. The two features of particular interest were the extensive areas of calcification in the tumor and the vascular obstruction which it caused.—*R. S. Bromer, M.D.*

Gentil, Francisco. Excision of the shaft of the tibia for sarcoma. Examination of a patient forty-three years after replacement by a fibular graft. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 389–391.

The case reported is that of a girl who at fourteen years of age had a segment of bone removed from the left tibia for a lesion which had been diagnosed as sarcoma, both clinically and roentgenologically. The excised segment was replaced by a graft of equal length from the fibula, the soft tissue attachments of which were disturbed as little as possible during mobilization in order to preserve the blood supply. The diagnosis both at the time of operation and on a review of the specimens for histopathological examination, forty-three years later, was sarcoma of osseous origin and fibroblastic and osteoblastic type.

Forty-three years after operation, the condition of the patient is satisfactory. Walking is normal and apart from some shortening the general appearance of the leg is normal. The roentgenogram made forty-three years later shows regeneration of the tibia with dense bone formation and of slightly less diameter than normal.—*R. S. Bromer, M.D.*

Ramioul, H., Gomez, J., and Damiean-Gillet. Granulome éosinophile de l'os (étude d'un cas). (Eosinophilic granuloma of the bone; report of a case.) *Acta chir. belg.*, July-Aug.-Sept., 1950, *49*, 626–633.

The authors present a detailed study of a case of eosinophilic granuloma of the rib. The patient, a female aged forty-two, complained of unilateral costal pain of five months' duration aggravated by deep inspiration. A history of trauma to this side of the chest was recalled. There were no other complaints.

Physical examination was essentially negative

except for exquisite pain over the lateral aspect of the left tenth rib on palpation, but no sign of tumefaction or inflammation could be seen. Roentgenograms revealed a triangular, well delineated, punched out bone defect of the inferior margin of the rib. The blood picture was normal.

A tentative diagnosis of an inflammatory lesion was made and a biopsy performed. The microscopic examination disclosed a proliferative granuloma consisting of histiocytes with some lymphocytes, plasmocytes, polymorphonuclear leukocytes and many eosinophils. The granuloma was limited by a zone of sclerotic bone.

The authors believe that eosinophilic granuloma may follow trauma or repeated small traumas. The microscopic picture is dominated by large pale cells with very large nuclei (histiocytes). In addition, there are eosinophils, neutrophils and lymphocytes as well as multinucleated giant cells. Such a picture reflects bone repair, and therefore it is the authors' opinion that eosinophilic granuloma fundamentally is a hyperplasia of the reticulo-endothelial system.—*Otto Kasik, M.D.*

Walker, D. Greer, and Lucas, R. B. Eosinophilic granuloma. *Proc. Roy. Soc. Med.*, Sept., 1950, *43*, 717–718.

Eosinophilic granuloma has been variously called solitary granuloma or nonspecific granuloma. The lesions may be single or multiple. Solitary lesions are more commonly seen than multiple lesions. This destructive process occurs in any bone without special site of predilection. Males are more commonly affected than females.

Eosinophilic granuloma is believed by some to be part of a fundamental disease process of which Hand-Schüller-Christian disease and Letterer-Siwe disease are examples.

The disease exhibits no symptoms or very minor symptoms. The commonest complaints are occasional malaise and slight pain and swelling. Peripheral blood studies show slight eosinophilia. Urinary findings are negative.

Many cases have been successfully treated by roentgen therapy. Curettage is equally successful.

Case report: A twenty-seven year old male presented a history of slight dull ache in left angle of mandible for one month. Dental examination was negative except for a little swelling which caused a slight trismus. The one tooth which remained near the lesion was sound. A roentgenogram showed: "There is some bone rarefaction in the region of the left angle of the mandible. It has little, however, in the way of specific appearances. There are no obvious diagnostic features." Roentgen examination of chest, pelvis, long bones and skull revealed no abnormality. Complete blood analysis was within normal limits.

A biopsy proved this lesion to be an eosinophilic granuloma. At the time of biopsy a débridement was performed.

Follow-up examination one year later showed no clinical evidence of recurrence or development of an independent lesion. A roentgenogram showed that the affected area had resolved to some extent and was about half its previous size.—*D. R. Bernhardt, M.D.*

Karpinski, Felix E., Jr., and Martin, James F. The skeletal lesions of leukemic children treated with aminopterin. *J. Pediat.*, Aug., 1950, *37*, 208–223.

The authors review briefly the literature in regard to the bone changes found in children suffering with leukemia. Silverman was the first to study roentgenographically the long bones of leukemic children treated with aminopterin. He found that the skeletal lesions in these children regressed and no new lesions developed. His study was based on only 7 cases. The authors of the present paper made a study of 33 children with leukemia, treated with aminopterin.

They found 12 cases with abnormal chest roentgenograms, including enlarged hilar lymph nodes, pleural effusion, parenchymal infiltration and hemorrhage, passive hyperemia, and pulmonary edema. None of these changes regressed during aminopterin therapy. Osteolytic skull lesions were found in 6 patients and did not respond to the aminopterin. Four patients developed widened sutures.

Sixty-six per cent of cases had long bone changes on the initial examination and a total of 81 per cent had long bone changes before the survey was completed. The usual location of the lesions was in the ends of the shafts of the long bones. Twelve cases had osteolysis, 11 had periosteal new bone formation, and 22 cases had transverse bands of lessened density at the ends of the shafts. This latter was the commonest and apparently the earliest demonstrable change. The authors feel that these bands of lessened density represent metabolic disturbances and not leukemic invasion. However, the latter is responsible for the osteolytic lesions and the periosteal new bone formation.

Four of 5 cases who had no demonstrable bone changes on the initial examination developed such changes during aminopterin therapy, and of 8 cases with bone changes initially only 1 regressed during this therapy. Seven cases are discussed in detail including film reproductions.

The authors also report on the finding of transverse bands of increased density at the ends of the long bones in leukemic patients. This was found in 5 of their cases. It was not related to aminopterin therapy. The authors feel it may represent general nutritional improvement of the bone. The bands appear to be transient and fade as the disease pro-

gresses. The conclusion is reached that while aminopterin can produce temporary clinical and hematological remissions in acute leukemia of childhood it cannot be said to have specific effect on the bone lesions seen in the disease.—*R. M. Harvey, M.D.*

Kleinsorge, Hellmuth. Akroosteolytische Erscheinungen der Osteomalacie. (Acro-osteolytic manifestations of osteomalacia.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, Aug., 1950, *73*, 471–475.

A recent case report of "acro-osteolysis" by Harnasch (see abstract in this Journal, Sept., 1950, *64*, 553–554) prompted the author to present the following case: A forty year old machinist had a history of joint rheumatism for seventeen years. Otherwise he was always well except for a tendency to eczema. Since release as a prisoner of war four years ago, he had noted increasing weakness beginning in the legs, so that he had difficulty in walking. For the past year he noted that the terminal phalanges of his hands had become wider, shorter, and clubbed. Patient was thin, anemic, and weak. Except for the clubbing of hands and feet, examination was negative. Marked polydipsia was present.

Roentgenologically, the significant findings were marked decalcification of all the bones, deformity of pelvis, cystic changes in many of the phalanges of the hands and feet, and finally, absorption of the terminal phalanges of the hands except for the base and tip. After vitamin therapy for about three months, not only did the patient recover symptomatically markedly but the changes in the bones and especially in the terminal phalanges of the hands became normal.

The author suggests that acro-osteolysis may be a manifestation of osteomalacia and that as yet it should not be considered a separate disease.—*Samuel Richman, M.D.*

Vogt, Alfred. Die generalisierte Hyperostose und ähnliche Systemerkrankungen der Knochen. (Generalized hyperostosis and similar systemic diseases of the bones.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, Aug., 1950, *73*, 411–441.

The osseous system in its entirety may be affected, aside from toxic diseases of the bones, avitaminoses, endocrine disturbances and tumor metastases, in senile osteoporosis, osteopoikilosis, osteitis deformans (Paget's), osteitis fibrosa cystica, and, in the years following the last war in Germany, hunger osteopathy. Osteosclerosis in blood diseases occupies a particular position. This can occur secondarily as in chronic myelogenous leukemia, but may become manifest as a primary bone disorder such as in "marble bone" disease.

Generalized hyperostosis is a systemic disease of the skeleton, as much as is osteoporosis senilis, osteitis deformans, etc. The conception of this disease is established as an increase of bone structure in the region of the endosteum and periosteum but not involving the joints. Uehlinger recognizes three stages: initially, the bone structure appears "washed out," lasting many weeks. Rheumatic pains may be present. This phase closes with a typical regeneration of all the bone structures with a thickening and coarsening of the medullary portion, making the shafts look thicker. In the second stage, there is in addition calcification of the ligaments around the bones, leading to synostosis of the joints. In the third stage, there is an increase in volume of the diaphyseal portion of all the bones, and pressure on the spinal cord and nerve roots develops.

The author reports the case of a thirty-one year old female, who entered the hospital because of mental depression. On the basis of chest film which showed thick, wide ribs with coarsening of the trabeculae, a systemic skeletal disease was suspected. The blood picture was normal and all other examinations remained negative. Roentgenograms of the entire skeleton showed endosteal sclerosis and rarefaction, as well as slight periosteal sclerosis. The shape of the bones was somewhat delicate but as a whole well proportioned, without deformity of any of the bones. The tubular bones were slightly widened in the region of their diaphyses. All the bones were involved similarly except the skull which showed questionable thickening and a pastel-like soft, reticular structure. Three other cases are presented with findings similar to the first but with some of the bones not involved.

Clinically, there is no way to differentiate generalized hyperostosis from other similar diseases. The chemistry problem has not been explored because of shortage of chemicals. No endocrine cause is known. Of the 31 cases collected from the literature by Uehlinger, 14 were familial. It is believed that the disease is chronic in nature and may progress slowly over a period of many years. During an acute exacerbation, there is marked increase in blood sedimentation rate and a mild secondary anemia.

Roentgenologically, the differential diagnosis from other diseases can always be made. In contrast to Paget's disease, there is no bone condensation and no thickening of the skull. Also, there is no bone deformity. The lamellar deposition in the long bones and the cystic sclerosing regeneration of the large bones are completely different from those found here. The author states that generalized hyperostosis is not so rare and that many cases have been called atypical osteitis deformans or atypical osteoporosis. He furthermore believes that the disease may be monostotic.—*Samuel Richman, M.D.*

Fairbank, H. A. Thomas. Fibrocystic disease

of bone. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 403–423.

In the introductory portion of this paper, Fairbank traces the noteworthy contributions on fibrous cystic disease of bone. He quotes Elmslie who in 1933 classified fibrocystic disease of bone as follows: (1) bone cyst; (2) osteoclastoma and osteoclastomatous cysts; (3) diffuse fibrosis of bone; (4) generalized diffuse fibrosis of bone, and (5) hyperparathyroidism. In 1937, Albright described the syndrome known by his name and in 1938, Lichtenstein reviewed the subject, his classification being essentially the same as Elmslie's and suggested "polyostotic fibrous dysplasia" as a suitable name for the cases of multiple diffuse fibrosis of bone without signs of hyperparathyroidism.

There are several other conditions of bone in which fibrosis forms a part of the pathological changes, such as Paget's disease, leontiasis ossea, renal rickets, osteopetrosis and it has been reported associated with generalized thyrotoxic osteoporosis.

The paper is divided into two portions, the first on polyostotic fibrous dysplasia and the second on leontiasis ossea.

Polyostotic fibrous dysplasia is characterized by multiple lesions in the skeleton; due to fibrous dysplasia of the bones but without the general decalcification and disturbance of calcium metabolism indicative of hyperparathyroidism. In a proportion of cases, at most one-third, there are in addition areas of pigmentation of the skin and, almost exclusively in females, precocious puberty giving the so-called Albright's syndrome. Except that the cases exhibiting the features of this syndrome usually show more advanced changes in the skeleton than those showing nothing but bone lesions, there is no essential difference between the two groups so far as the skeleton is concerned, and they are now regarded as variations of one and the same condition. Synonyms of polyostotic fibrous dysplasia are multiple diffuse fibrosis of bone, osteitis fibrosa disseminata, with Albright's syndrome as a sub-group.

Hereditary and familial influences do not affect the incidence of the disease. Many suggestions have been made as to the causation of the condition, but none has been generally accepted. In rather more than half the cases in the two groups, namely, Albright's syndrome and the group showing bone lesions only, the bone lesions are predominantly and occasionally completely unilateral in distribution. The onset is insidious, Attention may be called to an affected bone by a variety of incidents such as a fracture, the appearance of deformity due to either bending or local enlargement of a bone, or the development of asymmetry of the face and skull. Albright's syndrome has often been recognized in the very young when bone changes were still in an early stage of development or even confined to one bone. Skeletal precocity is more common than sexual precocity. The children grow too fast and appear tall for their age, but permanent fusion of the epiphyses occurs and growth ceases too early, with the result that their permanent height may be below the average.

The roentgenographic changes are seen in the shafts and metaphyses. Only rarely, the epiphyses show changes. After they are fused to the shafts they may exhibit some irregularity of density or mottling, or the lesions in the shafts may extend into them. There may be only a small lesion, somewhat cyst-like, or perhaps two separate lesions of this type, without distortion of the surface of the bone; at the other extreme, there may be complete involvement of the whole shaft which is both enlarged throughout and deformed and perhaps it may show signs of old or recent fracture. Sometimes increase in density is the chief feature but usually not invariably, this is accompanied by some enlargement of the shaft. The density often ends in three or four broad streaks toward one or both extremities of the bone. In the skull the changes vary considerably. The commonest change, especially in the early stages, is local thickening with irregular mottled density. Commencing in the maxilla, the malar region or elsewhere in the cranium, the changes gradually spread. They are frequently unilateral. As a rule, the changes are progressive, especially in severe cases, but they tend eventually to be arrested as skeletal growth ceases.

Complications are fractures which commonly unite readily; thyroid enlargement, exophthalmic goiter with association with basophilic adenoma in 1 reported case, arteriovenous aneurysm and development of sarcoma in an affected bone.

The essential pathological change is replacement of bone by relatively avascular fibrocellular tissue. In the differential diagnosis, hyperparathyroidism, xantho matosis, melorheostosis, Paget's disease, and neurofibromatosis, must be considered.

Leontiasis ossea (synonym—hyperostosis of skull) is characterized by hyperostosis of the facial and cranial bones. The literature on the subject is somewhat confusing since apparently identical changes in the skull have been reported under various titles and Paget's disease may produce somewhat similar changes. The essential feature is diffuse fibrosis combined with new bone formation (hyperostosis). Fairbank believes that there seems to be no reason for regarding leontiasis ossea occurring alone as different and distinct from the hyperostosis of the skull seen in many cases of polyostotic fibrous dysplasia. It may be assumed, particularly of the earlier reports, that in many cases of leontiasis ossea the skeleton was never searched for other lesions. Knaggs divided the cases of leontiasis ossea into two groups: (1) creeping periostitis, and (2) diffuse osteitis. Fairbank is not convinced that there is material difference between Knaggs' two groups, although one is more diffuse than the other. He believes that Weber

was justified in speaking of leontiasis ossea as "localized osteitis fibrosa of the face" and that this is true of all cases. He regards the evidence that it is not a form of Paget's disease as overwhelming.

The bones most affected are primarily the nasal, the malar, the maxilla just below the orbit, the mandible and the frontal and parietal bones. The alveolar processes of both jaws and the palate may be affected. A common first sign is asymmetry of the face or head. Chewing may be difficult because the articulation of the teeth is disturbed. In later stages the distortion of the features may be grotesque. The plasma phosphatase may be above normal.

In the vast majority of cases, the roentgenogram shows increased density, usually irregular and mottled, but occasionally almost uniform, and obvious thickening of the affected bones. Only occasionally are there clear areas seen suggestive of cystic change. The frontal and other sinuses are usually invisible.

As a rule, the condition is slowly progressive for many years. Pathological sections reveal fine-meshed cancellous spongy bone both forming the hyperostosis and replacing the bone beneath it. As a rule, however, the inner table of the skull is left unchanged. Malignant change has been reported only once, a fibrosarcoma growing in the nasopharynx of a patient with generalized thickening of the skull. Paget's disease is the most frequent alternative diagnosis. The presence of pigmentation and a history of precocious puberty would indicate Albright's syndrome. Meningomas may cause local hyperostosis, asymmetry of the face and exophthalmos. It should not be difficult to distinguish hyperostosis frontalis interna since it is the inner table of the skull alone which is thickened, the very part that is usually unaffected in leontiasis ossea.—*R. S. Bromer, M.D.*

Exner, Gerhard. Chondromatose—Dyschondroplasie—Ollier'sche Wachstumsstörung. (Chondromatosis, dyschondroplasia, Ollier's growth disturbance.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, Aug., 1950, *73*, 454–463.

Ollier's original report described 2 cases of multiple enchondromas with unilateral involvement of the body except for the hands and feet. Ollier's own description of dyschondroplasia has been generally accepted as meaning disseminated chondromatosis regardless of location.

The existence of pure, half-sided chondromatosis seems doubtful according to recent reports and the author's case.

This case was followed for twenty-two years and showed a shortening of the left lower extremity of 34 cm. The earliest changes were seen at the age of two, at which time the left femur, tibia and fibula showed large enchondromas. Subsequently, involvement of the left hand, left hemipelvis, left humerus and ribs bilaterally was noted. Films made after twenty-two years of observation showed involvement of the right upper and lower extremities in addition to the previously described defects. This then is a case of polyostotic chondromatosis which resembles Ollier's type because of the predominance of unilateral involvement. It is noteworthy that a small hemangioma and several soft fibromas were seen on the left side of the body.

The etiology, pathogenesis and clinical picture are discussed in great detail. The characteristic lesion is an enchondroma which becomes more or less generalized. The first noticeable change is a knobby enlargement of the bones of the hands or feet or disturbance of growth of an extremity.

The roentgen appearance can be divided into three stages: (1) Initial stage: Shows lines of condensation in the direction of the spongiosa. In the metaphysis the direction is the same as that of the blood vessels. (2) Stage of evolution: The process spreads from the metaphysis into the diaphysis; the primarily endosteal process breaks through the cortex and causes changes in the external contour of the bone. The appearance is varied and often cystic. (3) Stage of involution: Calcification of the cartilaginous masses takes place as well as periosteal bone formation. While this is a tendency to spontaneous repair, malignant degeneration may also occur.

The author's case presented an atypical lesion, hitherto not reported. It was a cystic lesion in the cortex of the left upper femur which spread along the inner surface of the cortex without causing any change in the external contour of the bone. Among the many theories mentioned to explain the etiology of this entity the tumor theory is the most likely one. Treatment is usually symptomatic. In certain cases removal of the focus and bone implantation can be done with good results.—*F. M. Reis, M.D.*

Strang, Christopher, and Rannie, Ian. Dyschondroplasia with haemangiomata (Maffucci's syndrome); report of a case complicated by intracranial chondrosarcoma. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 376–383.

Maffucci's syndrome consists of dyschondroplasia (Ollier's disease) with cavernous hemangiomas and phlebectasia. Twenty cases were collected by the authors and they add an additional one. In their case, death was caused by a chondrosarcoma of the sphenoid which led to subarachnoid hemorrhage, cranial nerve palsies, crossed hemiplegia and cavernous sinus thrombosis with almost total pituitary necrosis. At autopsy the bones, apart from the intracranial neoplasm, showed the recognized picture of dyschondroplasia with large areas of hyaline cartilage covered by normal lamellar bone or by perichondrium. The presence of hemopoietic marrow in

the neighborhood of the chondromas was confirmed. During the patient's illness, roentgenograms of all bones with the exception of those of the skull, clavicles and spine showed the characteristic changes of dyschondroplasia.—*R. S. Bromer, M.D.*

Mignoli, E., and Cocchi, U. Die Röntgendiagnostik und Strahlentherapie des Osteoklastoms. (Roentgen diagnosis and radiation therapy of osteoclastoma.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, Aug. 1950, *73*, 391–411.

The present general impression of osteoclastoma (giant cell tumor) is that it is a true neoplasm, which from the point of view of clinical course, anatomical, and roentgenological appearance, is to be regarded as benign.

Roentgen Diagnosis. Central and cortical forms are distinguished. Both are seen seldom in early stages because symptoms are usually absent or minimal and the patient is not examined. In the central form, the early stage is manifested by an oval or round, sharply outlined area of decreased density, giving the appearance of a cyst, usually in the epiphysis. The signs of malignant disease (irregular margins, osteoporosis, periosteal reaction) are absent. Later, the bone is expanded, the normal spongiosa structure disappears for the most part, and instead one sees thick strands between which small cyst-like areas are present, giving the appearance of numerous, small, clear bee-hive cells. As a whole, the tumor looks like a collection of large soap bubbles. Significant in differential diagnosis is the long time during which the cortex remains intact, appearing as a fine line without periosteal reaction. Progression of disease is manifested by pure osteolysis, the cortex is destroyed and the roentgenogram shows a large bone defect. In the cortical form, the lesion is in the metaphysis of long bones, especially in the phalanges of the hands.

Osteoclastoma is nearly always observed in one bone, may be silent clinically, and pathological fractures may occur. If the lesion is not treated, either spontaneous healing or malignant degeneration may ensue. Both possibilities have been reported by many writers. The authors had 5 cases of a total of 50, with malignant change. In 3 of these 5, the patients died from lung metastases. A true malignant change in an osteoclastoma occurs spontaneously and very seldom after radiation therapy.

Radiation Therapy. Twenty-three patients had roentgen therapy alone, 20 of which were cured: 17 over five years, with the longest being sixteen years. Twenty-three patients had a combination of surgery and roentgen therapy. Twenty-one were well: 17 over five years. The authors could find no difference between the results obtained by roentgen therapy alone and those obtained by surgery combined with roentgen therapy. Roentgen therapy was given with doses of 150 to 200 r (in air), most patients receiving 5,000 to 8,000 r (in air) during a period of twenty to fifty days. Of interest is the so-called paradoxical reaction during radiation therapy. Clinically, the pain and local swelling got worse in the first fourteen days after the beginning of the treatment. On roentgen examination, there seemed to be a rapid increase in the size of the tumor and a thinning of the cortical shell until the outline of the neoplasm disappeared. Four weeks after the beginning of the treatment, the reaction subsided and gradual bone regeneration followed, extending over a period of months. The reossification usually started in the periphery of the tumor appearing on the film as string-like and spotty sclerosis.

In summary, roentgen therapy is the choice treatment in those cases of osteoclastoma not too far advanced. Surgery plus roentgen therapy has shown a few more recurrences than roentgen therapy alone (in the authors' series). Atypical osteoclastomas should be treated surgically since these are radioresistant. Recurrences after roentgen therapy react well to further roentgen therapy.—*Samuel Richman, M.D.*

Vaughan-Jackson, O. J. Osteoid osteoma with unusual symptoms; case report. *J. Bone & Joint Surg.*, Aug., 1950, *32-B*, 368–369.

In osteoid osteoma, there is usually gradual, unexplained onset of pain, which is described as "boring" and "aching" and which occurs at night. It is relieved by aspirin though often by nothing else. In most cases the recorded pain has been closely referred to the site of the osteoid osteoma. In the case reported in this paper, the distribution of the pain was misleading, and suggests that in cases in which pain is typical, but the roentgenogram shows no abnormality in the area complained of, a wider roentgenological search for the lesion may be advisable. The pain complained of was located in the thigh while the actual lesion was found in the upper end of the shaft of the tibia.—*R. S. Bromer, M.D.*

Blood and Lymph System

Ravelli, A. Die Arteria lusoria im Röntgenbild. (Roentgenographic study of arteria lusoria). *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, July, 1950, *73*, 285–288.

Arteria lusoria refers to the anomalous right subclavian artery which arises as the last vessel from the aortic arch and passes behind the esophagus as it crosses from left to right. If the vertex of the aortic arch is high, there will be a horizontal pressure defect in the barium-filled esophagus best demonstrated roentgenologically in the left anterior oblique position. If the vertex is low, there will be an oblique pressure defect best seen in the right an-

terior oblique position. The proximal portion of the anomalous vessel is often dilated and resembles a diverticulum. The size of the pressure defect is proportional to the degree of dilatation.—*Joseph Zausner, M.D.*

Martin, Raymond S., and McCleery, Robert S. An improved method of venography for the preoperative evaluation of the postphlebitic extremity. *Surgery*, Aug., 1950, *28*, 322–341.

The authors describe an improved method of venography which demonstrates the status of the venous circulation in the postphlebitic extremity so that the proper therapy can be instituted. They recognize that all the postthrombotic changes are the result of a sustained increase in the venous pressure owing to complete deep obstruction or to retrograde venous pressure after recanalization.

They studied 75 clinical problems which included all types of chronic pathologic changes in the veins of the lower extremity. In 13 cases the method provided clear-cut preoperative indications for the interruption of femoral veins in which recanalization was demonstrated. Other problems studied included obstruction of deep venous channels, simple varicose veins with complications and the evaluation of changes suggested by minimal physical findings of disease of the deep veins.

Three of the commonest problems to be solved by this method are: (1) recognition of those patients who have a normal deep venous circulation so that attention may be directed to the treatment of local pathologic conditions and disorders associated with superficial varicose veins; (2) recognition of those patients who have complete obstruction of the deep veins as opposed to those who have partial obstruction or recanalization of these veins thereby rendering exploration of deep veins in the former instance unnecessary; (3) the identification of deep veins below the knee that are connected directly with the tributaries of the recanalized femoral vein, thus indicating that ligation of these veins may be done in order to relieve the orthostatic effect on the involved extremity.

The method includes the intravenous injection of a 35 per cent solution of diodrast after the patient has been tested for sensitivity by intradermal injection and a preliminary intravenous injection of 1 cc. of the solution. A No. 19 or 20 gauge needle is inserted into the dorsal vein on the foot or into the greater saphenous vein below the internal malleolus. Cannulation is rarely necessary. The needle is attached to a piece of small caliber rubber tubing which in turn is connected to a three-way stopcock. The needle is maintained in position by adhesive tape. The free arm of the stopcock is attached to an intravenous infusion set containing physiologic saline solution which serves to keep the needle and venous channel patent and to flush the veins free of the contrast medium after the injection.

The patient is examined in the supine position. A permanent roentgen tube is placed over the upper portion of the thigh and inguinal region and a portable roentgen tube is placed over the leg. A lead shield is hung between the two fields to absorb stray radiation. The table is maintained in the horizontal position. The superficial veins are obstructed by a tourniquet placed around the leg just above the malleoli. After the injection of 15 cc. of the medium, a lateral film of the leg is made with the extremity everted. As the remaining 15 cc. of the medium is injected, simultaneous exposures are made of the leg and thigh in the anteroposterior position with the use of two separate generators. If adequate filling of the normal deep venous circulation occurs, other exposures are not necessary. If obstruction of the deep venous channels is evident or if filling is incomplete with an appreciable portion of the medium passing through the superficial or collateral systems, a second set of roentgenograms is made of the leg and the thigh in the anteroposterior position. In addition to the ankle tourniquet applied as before a blood pressure cuff is wrapped about the lower end of the thigh and inflated to a pressure of 40 to 45 mm. of mercury, after which 30 cc. of medium is injected. The superficial veins are obliterated thus forcing all the medium possible through the veins of the deep circulation. The medium in the superficial collateral channels below the cuff also is diverted into the deep veins. Superficial veins above the level of the tourniquet fill only when the valves in the communicating veins are incompetent. This may be caused by simple varicose dilatation of the veins or an obstruction of the deep venous system accompanied by significant changes in pressure.

The authors classify venographic findings under three general categories: (1) Normal deep venous circulation. Two examples illustrating this category are presented. In each case normal roentgenograms were obtained in spite of clinical and other evidence to suggest possible thrombosis of the deep veins. (2) Obstruction of the deep venous channels. When this condition is caused by an old thrombosis with residual or complete obstruction, the medium proceeds to this region only by way of the collateral vessels in order to by-pass the obstruction. Venograms thus prove effective in indicating the level below which superficial veins may be safely excised in procedures designed to eliminate ulceration. Two illustrative cases together with their roentgenographic findings are presented. (3) Incomplete obstruction or recanalization of the deep vein after thrombophlebitis. After recanalization constant retrograde pressure is present whenever the limb is dependent. This pressure is believed to be responsible for the persistent and refractory complications of the postphlebitic extremity. In these cases the outlines of the veins

are shaggy and irregular and the medium may be diverted through multiple channels in such a region. The valves are almost always damaged. If recanalized veins are not demonstrable after the first injection it is probably because the channels which bypass these veins offer less resistance. In this event the blood pressure cuff above the lower thigh obliterates the collateral channels and alters the pressure differential sufficiently so that a greater concentration of medium courses through the recanalized vein. In 2 cases clinical and roentgenographic evidence illustrating this type of aberration of the deep vessels is presented.

The method thus helps to individualize the treatment of the postphlebitic extremity when it depends upon the status of these vessels. It is not advocated in all cases of simple varicose veins, but rather it has been limited to those cases in which a definite history of thrombosis is elicited or in which physical findings are present to suggest possible sequelae of thrombosis which cannot be explained adequately on the basis of other pathologic entities. The authors express the opinion that this method is more useful and informative than that employing the retrograde injection of medium in those cases in which recanalization has occurred or in which residual complete obstruction of the femoral vein is present. Eleven roentgenograms are reproduced and adjoining each is a line drawing indicating clearly the outline of the vessels so demonstrated by this method.—*C. B. Holman, M.D.*

Dotter, Charles T., Payne, Mary Ann, and O'Sullivan, Ward. Catheterization of the portal vein in man following portocaval anastomosis. *Ann. Surg.*, Aug., 1950, *132*, 310–311.

This is a brief report of the catheterization of the portal vein via the saphenous vein and inferior vena cava. A portocaval anastomosis had been made previously upon a patient who was under treatment for Laennec's cirrhosis,

Portal vein catheterization affords a direct method by which the portal vein blood may be investigated. —*J. H. Harris, M.D.*

March, Herman C. Leukemia in radiologists in a 20 year period. *Am. J. M. Sc.*, Sept., 1950, *220*, 282–286.

A comprehensive review of experimental work on mice exposed to roentgen rays is presented, showing an increased incidence of leukemia in animals so exposed. In 1944, March published an article pointing out that the incidence of leukemia in(its narrower sense) was more than ten times as great in radiologists as in non-radiological physicians. The present report is a continuation of the previous study and includes the ensuing five year period, 1944 to 1948, inclusive. During the twenty-year period now reviewed by the author, leukemia has occurred more than nine times as frequently in radiologists as in non-radiological physicians. It has been observed by Dublin and Spiegelman, and by Henshaw and Hawkins that the incidence of leukemia is almost twice as great in physicians as a whole as in the general adult male white population. March has pointed out that the bulk of this increase was due to the inclusion of radiologists in the statistics for physicians. When only non-radiological physicians are considered, the increased incidence is only slight and may perhaps be explained by the considerable number of non-radiological physicians who use fluoroscopes, roentgenographic apparatus, radium and radioactive isotopes in their clinical or investigative work.—*S. G. Henderson, M.D.*

Haden, Russell L., and Portmann, U. V. Extremely high lymphocyte count in lymphatic leukemia; report of a case. *Ann. Int. Med.*, Sept., 1950, *33*, 717–718.

The case presented is of interest because of the markedly elevated white blood count, 2,300,000, most of which were mature lymphocytes. The authors report white blood counts approaching 1 million but find no reference to a count of over 2 million.

In the first year this patient received roentgen treatment by the whole body treatment method, associated with local irradiation of the spleen. The white blood count was reduced to 1,050,000. In the following year roentgen therapy was given intermittently at various intervals and the white blood count dropped to 137,000. The patient then became progressively more anemic and in spite of blood transfusions the erythrocyte count fell to 1,380,000 and the hemoglobin to 33 per cent. Death occurred twenty-three months after admission.—*W. W. Maver, M.D.*

Mosbech, Johannes, and Videbaek, Aage. Mortality from and risk of gastric carcinoma among patients with pernicious anemia. *Brit. M. J.*, Aug. 12, 1950, *2*, 390–394.

A study is presented of 301 cases of pernicious anemia seen at the Bispebjerg Hospital, Copenhagen, from 1928 to 1949. It was found that over-all mortality did not differ significantly from the predicted mortality among the general population of similar sex and age distribution. It was also found that death from carcinoma corresponded closely with predicted figures for the general population. The incidence of death from gastric carcinoma was significantly higher, however, being two and one-half times the expected rate in females and four times the expected rate among the males.

The authors discuss the theory that the high inci-

dence of gastric carcinoma in pernicious anemia is due to the occurrence of atrophic gastritis in pernicious anemia. They point out that the gastritis is localized primarily to the fundal area but that there is no such localization of the tumors in their series. They therefore conclude that there is no direct relationship between atrophic gastritis and the development of carcinoma. The authors suggest that the particular prediposition to gastric carcinoma among patients suffering from pernicious anemia may be due to the fact that both conditions result from achlorhydria, and investigations are being carried out on the familial occurrence of achlorhydria pernicious anemia, and gastric carcinoma.—*L. K. Sycamore, M.D.*

General

Magner, Desmond. Exfoliative cytological diagnosis. *Canad. M. A. J.*, Aug., 1950, *63*, 103–109.

The author discusses the accuracy and practicability of cytological methods of diagnosis in relation to a cancer detection program. With reference to the vaginal smear technique, a correct diagnosis may be made in 90 per cent of cases of cancer of the uterine cervix, and in approximately 80 per cent of cases of cancer of the endometrium. The correctness of the diagnosis is based upon absolute clinical evidence or on tissue biopsy.

In the diagnosis of cancer of the lung, cytological methods may be applied to examination of bronchial secretions obtained at bronchoscopy, and of sputum expectorated by the patient. The percentage of correctly positive results ranges from 72 to 89 per cent.

In suspected cases of carcinoma of the stomach, the sediment from gastric washings may be examined. The percentage of correct diagnosis varies from 48 to 54 per cent.

Smears of the urinary sediment in suspected cancer of the kidney have yielded correct positive results in approximately 50 per cent of cases. With carcinoma of the bladder, positive diagnoses are established in 70 per cent of cases by examination of the sediment.

The examination of pleural or peritoneal fluid when metastatic cancer is present yields positive results in from 66 to 100 per cent of cases.

The accuracy of cytological diagnosis depends upon the training and experience of the examiner, and also upon the smear or sediment containing cancer cells at the time they are obtained. False negative and false positive reports may occur even in the hands of skilled examiners, indicating that tissue biopsy should not be discarded.

The author concludes that cytological techniques would not be satisfactory for mass screening because skilled examiners are not generally available, the cost is high, and a relatively low yield in asymptomatic cases of cancer could be expected.—*C. L. Hinkel, M.D.*

Clara, R., and Thys, L. La calcinose interstitielle universelle (calcinosis interstitialis generalizata). (General interstitial calcinosis [calcinosis interstitialis generalisata].) *J. belge de radiol.*, June, 1950, *33*, 135–155.

This is a rare disease which occurs between the ages of eight to twelve years, more often in female than male. It is characterized by subcutaneous calcified nodules or sometimes by diffuse calcification of the connective tissue. The nodules in time will ulcerate and heal as painful scars. They are more often seen around the knees, the hips, the shoulders and the elbows. The movements of these joints are restricted. There is subsequent muscular atrophy.

In addition to subcutaneous calcifications, generalized osteopetrosis is noted on the roentgenograms and there is developmental retardation of the osseous system, mainly of the femora and humeri.

Calcareous material is expelled from the ulcerated nodules. This is followed by temporary improvement. More often the ulcers become secondarily infected, and generalized infection leads to death.

One typical case is reported. The article is illustrated with reproductions of excellent roentgenograms and photographs. In discussing the differential diagnosis, the author enumerates the salient features of several rare conditions. But usually the disease is to be distinguished from either lipo-calcino-granulomatosis or myositis ossificans progressiva.

The following criteria are of value in the differential diagnosis from myositis ossificans progressiva:

1. Myositis ossificans is more common in the male, whereas calcinosis interstitialis is more common in the female.

2. Myositis is painful at the onset, calcinosis begins insidiously and is painless.

3. Myositis leads to bone formation, calcinosis consists of simple calcification.

4. Myositis is irreversible, calcinosis will regress to some extent after ulceration of the nodules.

5. Myositis affects primarily the muscles of the trunk, calcinosis involves the upper and lower extremities, the calcifications being localized mainly about the joints.

6. Myositis never affects the skin, whereas this structure is always involved in calcinosis.

7. Congenital anomalies are seen in association with myositis but not with calcinosis.

8. The electrical excitability of the muscles is diminished in myositis, it is normal in calcinosis.

The etiology is discussed. There is no existing satisfactory treatment at present. The disease invariably leads to death although temporary improvement may occur.

The article is followed by an extensive bibliography.—*J.-P. Jean, M.D.*

McCarroll, H. Relton. Clinical manifestations of congenital neurofibromatosis. *J. Bone & Joint Surg.*, July, 1950, *32-A*, 601–617.

In his summary the author states that he has made an attempt to enumerate or describe briefly the various clinical manifestations which may be associated with congenital neurofibromatosis. In some instances the direct relationship can be proved, but in the majority of cases this has to be assumed. The frequency with which these various questionable manifestations are associated with unmistakable signs of neurofibromatosis, however, and the tissue characteristics which are found so commonly in all cases of soft tissue hypertrophy, represent strong presumptive evidence that all may arise from a common etiology—a primary developmental defect of the nervous system.

In the series of cases studied, the various clinical characteristics have been classified under five major headings: cutaneous, subcutaneous, skeletal, vascular and lymphatic. Each heading is considered separately, although they practically never exist individually and many different types of involvement are encountered in the same patient. Associated mental deficiency, described by Gould, was not prominent in the series and was suspected in only 1 case.

In regard to the skeletal involvement, scoliosis was the first described. It represents the most common abnormality of the series. Abnormalities of growth may result simply in increased length or an over-all hypertrophy of involved bones. Congenital shortening was present in one lower extremity. Bone cysts were encountered in 2 patients. Congenital pseudarthrosis of the tibia was present in 5 cases, all of which had numerous cafe au lait spots. In 1 patient the entire area of pseudarthrosis was excised preliminary to the insertion of bone grafts, but no nerve tissue could be demonstrated in this area or in the cystic change of the proximal bone fragment immediately adjacent to it. Two conditions were found of which the authors could find no record in the literature: spondylolisthesis and melorheostosis. In 1 patient there was a massive calcified tumor mass in the right ischial bursa.—*R. S. Bromer, M.D.*

Neill, Catherine A., and Dingwall, Mary M. A syndrome resembling progeria; a review of two cases. *Arch. Dis. Childhood*, Sept., 1950, *25*, 213–223.

Two microcephalic dwarf brothers are described in some detail by the authors as examples of a syndrome allied to progeria. They present similar clinical pictures, the outstanding features being dwarfism, microcephaly, a fine, diffuse, characteristic "pepper and salt" choriodoretinitis, and intracranial calcification. The older has recently developed deafness. Both children are classifiable as idiots and there is a gross degree of sexual infantilism. Two other children in the family appear normal and are of average intelligence.

Progeria was first described by Hutchinson in 1886 and re-described by Gilford in 1904, the latter adding a second case of his own. Since then about 20 classical cases have been described. The essential features are dwarfism, loss of hair, an old appearance, loss of subcutaneous fat, a dry stretched skin with some wrinkling, arthritis producing the typical posture, osteoporosis and arteriosclerosis. The last-named is the usual cause of death. Mentality is usually normal or slightly below normal.

The authors' 2 cases were not bald and their theory is that the two dwarfs represent a multiple germ plasm defect, similar to that of progeria.—*A. B. Smith, M.D.*

Thomson, James, and Forfar, John O. Progeria (Hutchinson-Gilford syndrome); report of a case and review of the literature. *Arch. Dis. Childhood*, Sept., 1950, *25*, 224–234.

. . . The poor little boy didn't live to contrive,
His health didn't thrive,
No longer alive,
He died an enfeebled old dotard at five.
W. S. Gilbert (1869)

The first case of progeria to be described in medical literature was that of Hutchinson in 1886, under the title of "Congenital Absence of Hair and Mammary Glands." Hastings Gilford (1897) recognizing the condition as a clinical entity, described a case of his own and re-described Hutchinson's original case. He introduced the term "progeria" (prematurely old). Only 18 typical cases have so far been reported.

The authors' case was first seen at the age of twenty-two months and has been examined at intervals for 2½ years. The general appearance at the age of 4½ years is striking. In his smallness of stature, restless activity, impish behavior and ready recourse to tears, his high-pitched piping voice and his interest in playthings, he was a small boy; in his thinness and absence of subcutaneous fat, his bald head and pinched facies, his dry, atrophic inelastic skin, his wrinkled hands, bent posture and slightly flexed joints, he was an old man.

Roentgenologically, the cranium was thin, the pituitary fossa enlarged; there was no intracranial calcification. At the age of 4½ years the carpus showed an ossification age of 3–3½ years. The clavicles were short and thin, a characteristic finding.

A raised creatine/creatinine ratio does not appear to have been recorded previously.

We are little nearer understanding the pathological processes associated with progeria than Gilford was half a century ago. We can watch the occurrence, over a span of ten to fifteen years, of changes of

senility which would normally take five or six times as long to develop. The changes are not, however, merely those of senility. They are those of senility imposed at an infantile stage of development so that infantile characteristics persist side by side with senile ones. Examples are the changes in the bony skeleton, the atrophic skin and arteriosclerosis.

Gilford was impressed by the contrasting features of progeria and acromegaly and his original name for the syndrome was micromegaly. There is some similarity of progeria with Simmonds' disease. The authors feel that the primary defect in progeria is one of pituitary dysfunction. As hyperfunction of the eosinophil cells of the pituitary may produce the changes of acromegaly it seems logical to deduce that hypofunction of these cells at an early age may produce the characteristic changes of progeria.—*A. B. Smith, M.D.*

RADIATION THERAPY

Jackson, Hunter S., and New, Gordon B. Carcinoma of the buccal mucosa; treatment and end results. *Surg., Gynec. & Obst.*, Aug., 1950, *91*, 232–241.

Carcinoma of the inner surface of the cheek is a disease that can be readily visualized and for which radical treatment gives a high percentage of good results. This study of carcinoma of the buccal surface of the cheek covers 107 consecutive cases encountered at the Mayo Clinic in the decade January 1, 1932, through December 31, 1941. This period was chosen to allow a five-year follow-up in all cases.

It has been estimated that cancer of the oral and pharyngeal mucous membranes constitutes 3 per cent of all cancers and causes approximately 3,700 deaths yearly in the United States.

The etiology of buccal and lingual cancers has been ascribed to one or more of the following factors: syphilis, tobacco, decayed teeth, trauma and irritation from broken teeth and artificial dentures. In the present series of cases, 15 per cent of the carcinomas were associated with leukoplakia.

The treatment of choice in carcinoma of the inner part of the cheek, the majority of which are squamous cell, is complete destruction of the primary lesion with surgical diathermy and dissection of the submental, bilateral submaxillary and upper deep cervical lymph nodes. This should be followed by a block dissection if a lymph node with a metastatic lesion is found. Radiation therapy should be used in addition to surgical treatment when there is involvement of the lymph nodes.

In the series of cases presented, 48 of the 93 traced patients survived five years, giving a survival rate of 51.6 per cent.—*Mary Frances Vastine, M.D.*

Diethelm, L. Zur Frage der Strahlenbehandlung beim operablen Mammacarcinom. (Radiation therapy of operable carcinoma of the breast.) *Strahlentherapie*, 1950, *83*, 327–338.

The author reviews the cases of mammary carcinoma from the Surgical Clinic at the University of Kiel with particular reference to the value of radiation therapy in operable cases. Among his conclusions are: (1) that energetic fractionated postoperative therapy improves the survival rate over that attained by radical resection alone, and (2) that for more advanced stages of, or inoperable, mammary carcinoma even more intensive radiation therapy is indicated.

Eleven statistical tables detail his data. Of 940 patients subjected to radical operation from 1908 to 1945, 197 received no irradiation and 685 were irradiated. The remainder were either lost to follow-up or died immediately after operation. Of these patients, the unirradiated had a 44.1 per cent three year and 32.2 per cent five year survival as opposed to 64.9 per cent and 48.1 per cent respectively for the irradiated cases. The greatest number of cases and the most convincing evidence of the value of irradiation occurred in the patients with metastases to axillary nodes and with or without infiltration of the tumor into the skin, fascia, or pectoralis muscles.

A compilation of 778 *un*treated cases from the literature yielded these survival percentages: one year survival, 59 per cent; two year, 37 per cent; three year, 24 per cent; four year, 17 per cent; five year, 13 per cent and ten year, 4 per cent. These survival times are calculated from the time the carcinoma was recognized.

The author expresses the opinion that during the war years (1940–1945) undernutrition permitted women to detect smaller breast tumors earlier and thus resulted in earlier operation than previously.—*H. G. Moehring, M.D.*

Deist, H. Zur Röntgenbestrahlung von tuberkulösen Restkavernen nach Thorakoplastik. (Roentgen therapy of residual tuberculous cavities following thoracoplasty.) *Deutsche med. Wchnschr.*, Sept. 29, 1950, *75*, 1285–1287.

Bacmeister and Küpferle found in animal experiments that roentgen irradiation causes a fibrotic change of the tubercle and in cases of pre-existing necrosis a gradual fibrosis of the neighboring tissues with isolation of the tubercle. The tuberculous granulation tissue, which is very highly sensitive, can be made to disappear. The thoery of the effect is based upon the experience that roentgen rays not only inhibit the inflammation but also stimulate the formation of fibrous tissue. This effect does not occur immediately but gradually.

The greatest difficulty is the determination of the threshold value of the dose. The dose has to be sufficient to stimulate the formation of fibrous tissue

but, on the other hand, it must not be so large as to cause increased necrosis.

It was found that small doses over a prolonged period of time were most effective. Doses of 1/40 to 1/10 of a skin erythema dose, given at intervals of eight to ten days, over a period of two to four months, were quite effective.

Roentgen therapy is accepted today only for the treatment of tuberculous cervical lymph nodes and of tuberculosis of the peritoneum. Tuberculosis of the lung is usually not treated by irradiation. In the opinion of the author, however, there is an indication for such treatment in patients who show a tendency to productive fibrosis and are completely free of fever. In particular, cases with residual cavitation following thoracoplasty may be irradiated in view of the fact that such cavities do not respond well to conservative treatment and further surgery is usually not satisfactory or helpful.

The author has treated 10 such cases with roentgen therapy over the last two years; 26 r was given in three to four individual treatments, and this series was repeated after four weeks. Four of the patients showed excellent results, 2 doubtful results, 1 was improved, and 3 patients are still under treatment and cannot be satisfactorily evaluated as yet.—*H. P. Mueller, M.D.*

Schindler, Rudolf, Schlosberg, Stanley S., and Benjamin, Max. Radiation therapy of carcinoma of the cardia. *Radiology*, Aug., 1950, *55*, 223–227.

Radiation therapy of carcinoma of the stomach has fallen into disuse because of the following reasons: (1) 90 per cent are believed to be insensitive and prediction of sensitivity is difficult, (2) localization is difficult because of mobility of the stomach, (3) adrenals, liver, and pancreas are irradiated as well, (4) the patients are often in poor condition, and (5) perforation and hemorrhage from necrosis are likely. In spite of this, such therapy may be helpful.

Three cases of inoperable carcinoma of the cardia showed almost complete regression of the primary tumor after radiation therapy. One case with a large polypoid tumor which was biopsied at surgery showed only microscopic rests in the stomach at autopsy. Deaths were due to metastasis but therapy relieved symptoms and lengthened life.

Details of therapy for one case were: 300 r (air) to each of three portals immediately following laparotomy. One month later, the patient received, over a period of a month, 1,200 r (air) with 250 kv., half-value layer of 2 mm. Cu, 50 cm. distance, field 10 by 15 cm., to each of anterior, lateral, and posterior ports in daily doses of 90–120 r. Additional therapy was given three months later for spread to the pylorus, this region being localized by fluoroscopy on the same table that was used for therapy. Localization with barium and without moving patient subsequently is stressed. The dose amounted to 1,000 r (air) administered to anterior and posterior portals, crossfiring the pyloric region.—*M. B. Goodwin, M.D.*

Jewett, Hugh J. Carcinoma of the bladder; treatment and prognosis. *South. M. J.*, Aug., 1950, *43*, 661–667.

The article deals chiefly with the various methods of treatment of vesical tumors. An evaluation of what can be expected from the various procedures will depend primarily upon the depth of infiltration and secondarily upon their size, location, multiplicity and histopathology.

In general, non-infiltrating tumors can be completely destroyed by transurethral fulguration. Dean advises implantation of radon seeds with or without electrocoagulation when the base is not larger than 2.5 cm. in diameter. In cases of widespread multiple papillomas, recurrences may be so rapid that total cystectomy becomes necessary.

Infiltrating tumors which have extended less than halfway through the muscularis usually are localized to the bladder wall. Any procedure capable of eradicating such a localized growth should result in a cure Complete removal is possible by cystectomy and by segmental resection. Complete destruction is also possible by electrosurgery, electrocoagulation and by radon implantation.

It is felt that, as a whole, tumors of the bladder are resistant to external irradiation although the method is sometimes useful in controlling severe hemorrhage and multiple papillomas. Occasionally, life may be prolonged by its use in hopelessly advanced cases.

Barringer reported his five year survivals in a series of 255 cases treated with radon as follows: papillary carcinoma, 52 per cent; infiltrating carcinoma, 23.6 per cent; tumors of Grade 1 malignancy, 55 per cent; Grade 2, 32 per cent; Grades 3 and 4, 11 per cent.

Infiltrating tumors which have extended more than halfway through the muscularis usually have metastasized and the five year survival rate is very low. In these deeply infiltrating tumors, cystectomy which fails to remove all the tumor actually hastens death. The low survival rate from this procedure leads some workers to advocate pelvic lymph node resection with total cystectomy. It is pointed out, however, that when metastases have occurred, they are blood borne in about 40 per cent of the cases. Most surgeons feel that total cystectomy should not be done as a palliative measure. It should be done with the expectation of a cure and therefore only when the tumor is localized to the bladder.

The prospect for cure is best determined by ascertaining the depth to which the tumor has penetrated the bladder floor. This can be done with a high degree of accuracy by means of the bimanual pelvic examination.

The correlation of the biopsy with the pelvic examination has the following significance: (1) noninfiltrating and infiltrating tumors are accurately segregated; (2) in the infiltrating group absence of a palpable induration in the case of a tumor in a normally accessible area, with the patient adequately relaxed, indicates, practically always, superficial infiltration and strict localization of the tumor to the bladder wall; (3) rubbery induration, even without fixation, and without involvement of the inferolateral ligaments, indicates deep infiltration. Metastases nearly always have occurred, except occasionally in the case of well differentiated papillary carcinomas; (4) stony induration; and (5) induration of an inferolateral ligament indicate deep infiltration with extravesical extension and metastasis.—*J. G. Snead, M.D.*

Evans, Orville T. Radiation proctitis; diagnosis and treatment. *South. M. J.*, Aug., 1950, *43*, 667–670.

This paper reviews the literature on the subject of radiation prostitis and the author discusses 20 cases of his own.

The inflammatory reaction occasionally found in the rectum and terminal colon after radium or roentgen therapy is specific and characterized by certain pathognomonic signs. The condition develops in approximately 3 per cent of patients five to six months after treatment. The lesions fall into two categories: "early" and "late" or "transient" and "permanent." The late reactions may be divided into two groups: (1) those in which the reaction is limited to the rectum, and (2) those in which the rectum is involved in massive perirectal inflammation. The latter may simulate a carcinoma.

The prognosis varies with the response of the primary lesion to radiation therapy. If the malignant lesion is eradicated, the proctitis is a self-limiting complication which will heal with or without treatment. When stenosis or obstruction of the rectum or colon has occurred, the process is irreversible and a permanent colostomy is required. Colostomy is of little value in treatment of the acute condition since it has little effect upon the healing of the ulcer, and the prevention of fistulae or stenosis. It is a definite adjunct when there is hemorrhage.

Symptomatic and supportive treatment play an important part in this condition. A high caloric diet, low in residue and supplemented with iron and vitamins is urged. The rectum should be kept clean as much as possible. Mineral oil is not used as a laxative because of the tendency to seep into the rectum, causing constant fecal soiling. The injection of an analgesic agent such as procaine in oil may be effective in relieving tenesmus and frequency.

The author recommends sulfathalidine for periods from one to six months. It is doubtful if any of these cases are cured; however, of the 20 cases observed by the author, 15 who have survived the malignant condition for which the irradiation was undertaken are comfortable and experiencing minimal symptoms. —*J. G. Snead, M.D.*

Miller, Clay O., Buehrig, Milton R., and Haeger, R. Ross. A study of carcinoma of the prostate before and after advent of hormonal therapy. *Urol. & Cutan. Rev.*, Aug., 1950, *54*, 465–468.

This article is a statistical summary and analysis of 424 patients with carcinoma of the prostate of whom 421 had a follow-up and 354 had microscopically proved diagnosis. The most common complaints in this group of patients were frequency, difficulty of urination and pain in the back and extremities. The age distribution was from twenty-one to ninety-nine years, with an average age of 59.8 years. Rectal examination showed a normal prostate in 12 cases and 22 of the patients showed a smooth enlargement. In the remaining 92 per cent of the cases the prostate showed one of the following characteristics: hardness, nodularity, fixation, irregularity, obliteration of the median furrow, or extension to the seminal vesicles.

The authors used all of the well known modalities of treatment, including purely supportive therapy, roentgen therapy, radon seeds, suprapubic prostatectomy, perineal prostatectomy, transurethral resection, and endocrine therapy. As a result of their experience, they believe that all patients with inoperable cancer of the prostate should have an orchiectomy and endocrine therapy and that in no instance should a transurethral resection be done if it can possibly be avoided. The best results were in the patients in whom an early diagnosis permitted a radical perineal prostatectomy. Irradiation is, in their opinion, of no value and may increase the discomfort of the patient.

In 206 patients who were variously treated without endocrine therapy or castration, the average survival was 17.3 months.

In 215 patients who were variously treated and also received hormonal treatment, the average survival was 22.4 months.

This indicates that the average survival period has risen by approximately six months since the advent of endocrine therapy in this group of patients.—*G. W. Chamberlin, M.D.*

Weber, Lennard L. Intracavitary radium at time of vaginal plastic operation. *Am. J. Obst. & Gynec.*, Aug., 1950, *60*, 371–378.

The purpose of this paper is to settle the question as to whether there is impairment of wound healing in the presence of radium therapy. Often in the insertion of radium for benign uterine disease a vaginal plastic is indicated but many gynecologists

have hesitated to do both procedures simultaneously on account of the fear of wound breakdown.

The author reviewed 131 consecutive patients who have had intrauterine radium for benign disease and repair of the vagina at the same time. The radium dose ranged from 500 mg. hr. to 3,600 mg. hr. The results showed that it is safe to use intracavitary radium at the time of vaginal plastic operations as no wound failed to heal properly.—*Joseph Levitin, M.D.*

Swyngedauw, J., Geneau, P., and Montaigne, E. La roentgenthérapie complémentaire du cancer du col. (Complementary roentgen therapy in cancer of the uterine cervix.) *Bull. Assoc. franç. l'étude cancer*, 1950, *37*, 249–255.

The authors have made direct measurements on cadavers in order to compare the depth dose both on the cervix and the pelvic wall. Two different techniques were used: (1) two large opposing fields (15 by 20 cm.); (2) four fields (15 by 15 cm.) with a medial tilt of 40 degrees to the midline and separated in such a fashion as to produce an almost completely homogeneous irradiation of the pelvis. In the latter technique the measurements were made under two different conditions, either by tilting the tube medially or tilting the cadaver. It was found that by tilting the cadaver the dose was appreciably increased due to the displacement of the small intestine. With tilt of the cadaver there was an increase of 61 per cent of the depth dose on the cervix and 50 per cent on the pelvic wall as compared with the two opposing field technique. In each technique the dose to the parametria was 85 to 90 per cent of the dose on the cervix. Direct measurements on the cervix were made on living patients with both techniques; results were very similar to those found on cadavers.

The authors give 3,000 r (skin dose) to each portal, resulting in a mean dose of 3,700 r on the cervix and 3,300 r to the pelvic wall. The radium dosage is planned accordingly, using an applicator which they have devised.—*G. H. Fletcher, M.D.*

Mallet, L., Moulonguet, P., and Decker, R. Roentgenthérapie transvaginale pénétrante dans le cancer du col utérin. (Transvaginal therapy with penetrating roentgen rays in carcinoma of the uterine cervix.) *Bull. Assoc. franç. l'étude cancer*, 1950, *37*, 285–294.

After reviewing the history of transvaginal therapy with the various factors used, the authors state the reasons why they prefer radiopaque cones, 200 kv., copper filtration, and 50 cm. distance.

Using a phantom of a female pelvis imbedded in a block of wax and paraffin mixture, dose distributions were determined with very small ionization chambers for various arrangements of transvaginal fields.

The authors have developed a ten portal technique five portals being directed horizontally, with a lateral tilt to the left and right of 15 and 30 degrees respectively. Five more portals are used with the same lateral tilts but directed 10 to 25 degrees posteriorly, depending upon the patient. The external diameters of the cones are either 3 cm. or 3.6 cm., the larger one being used whenever possible. A dose of 5,000 r is given to each portal in six to eight weeks. The vaginal mucosa may receive as much as 18,000 r where there is the most overlapping of several fields. These doses have been well tolerated, producing only a mild degree of mucositis and no severe bladder or rectal reactions.

In Stage I carcinoma, when it is planned to perform a Wertheim operation after completion of the roentgen therapy, only six portals are used, three horizontal, the two lateral being tilted 15 degrees to the right and to the left, and two posterior with a tilt of 10 to 25 degrees downward, as previously stated. Each of these portals receives 5,000 to 7,000 r. The operation is then performed three to four weeks after the completion of the transvaginal therapy. No surgical complications were observed; in a high number of instances no residual viable tumor was found in the operative specimen.

In Stage III and IV carcinoma external irradiation is added to the transvaginal therapy. A particular type of cyclotherapy developed by the authors is being used more and more, giving a greater depth dose.

A number of cases are reported with details of the roentgen therapy and surgical follow-up.—*G. H. Fletcher, M.D.*

Ries, J. Operation oder Bestrahlung des Collum-Carcinoms? (Operation or irradiation of carcinoma of the uterine cervix?) *Strahlentherapie*, 1950, *83*, 477–492.

Surgical-elective therapy does not surpass radiation therapy in the treatment of carcinoma of the uterine cervix. This holds true not only for the absolute cure rate, but for the relative cure rate in Stages I and II. In addition, the patient is subjected to only a slight hazard by radiation therapy. Hence, radiation therapy is the treatment of choice for carcinoma of the cervix at the First Gynecologic Clinic of the University at Münich.—*H. G. Moehring, M.D.*

RADIOISOTOPES

Veall, N. Diagnostic and therapeutic uses of radioactive isotopes. I. Some general problems in connection with the measurement of radioactivity in patients. *Brit. J. Radiol.*, Sept., 1950, *23*, 527–534.

The authors emphasize certain factors common

to all in vivo counting techniques applied to radioactive isotopes in patients. When planning such measurements it is necessary to know the time scale of the experiment, the source of probable background radiation sources, and the capabilities and limitations of available equipment. An understanding of these factors permits the utilization of optimum experimental conditions, thereby decreasing the amount of radiation delivered to the patient.

The degree of accuracy in counting is limited by experimental errors in time, change in the distribution of the radioactive material, and keeping the patient in one position for a prolonged period. Several means of increasing experimental accuracy are listed. The background radiation should be reduced to as small a percentage of the intensity of radiation being measured as possible. This is accomplished by the use of lead shields. Equipment should be designed to permit ease and rapidity of maneuvering. Automatic recording devices conserve time and eliminate personal errors in computation. Radiation detecting equipment with the highest intrinsic efficiency for the purpose employed must be obtained.

Counting techniques can be classified first as those measuring radioactivity as a function of time. Here, radiation from the tissue under study, radiation from tissues other than those under study, and background radiation due to cosmic rays and radioactive materials in the general vicinity must be taken into account. Different time variations and constants of proportionality must be calculated for the tissue being studied and the surrounding tissues. Tissue counts over the thigh are utilized in determining the latter constant. Formulae are given which allow for these constants. In measuring I^{131} uptake in the thyroid, accurate positioning is important to reduplicate the geometrical relationship between the patient and the counter. The use of Na^{24} in investigating vascular diseases of the extremity must be carried out under rigidly controlled conditions since environmental temperature and humidity have a profound effect. Many constants, such as the tissue clearance constant, must be individually determined on each patient before reliable results will be forthcoming. The utilization of disappearance rates as well as uptake rates is essential.

Secondly, distribution of radioactive materials is measured in various tissues at a given time. In some situations, a combination of this method and that utilizing the function of time are necessary. Distribution studies employ two techniques; in (1) the counting rate is a function of the counter's position and the readings are interpreted on the basis of the inverse square law, and in the other (2) a detecting device with directional properties is set up in a rectangular or polar coordinate system. The first of these techniques is not capable of high accuracy but is useful in rapid qualitative work where there is a local accumulation of material well away from the relevant axis of symmetry and is close to the body surface. This has been successfully used in localization of the placental site in 31 of 34 cases. In the second technique, an optimum value for the counter aperture depends upon the fixed time available for measurement, the given concentration of radioactive material and the established efficiency of the counter. Increasing the sensitivity of the counter (such as is found in the scintillation counter), and increasing the quantity of radioactive material will decrease statistical errors. This method, used in I^{131} studies, does not give a high degree of precision. A new counter tube used by the authors, however, resolves two separate point sources of I^{131} 1.5 cm. apart at a distance of 25 cm. from the counter. A method of determining radiation dose to the thyroid is described.

In choosing an isotope for a particular investigation, the isotope with the shortest effective half-life compatible with the time scale of the experiment and with the lowest energy per disintegration (low energy gamma rays) should be used.—*K. L. Krabbenhoft, M.D.*

Haigh, C. P., and Reiss, M. Diagnostic and therapeutic uses of radioactive isotopes. II. Some applications of I^{131} and Na^{24} to clinical diagnoses. *Brit. J. Radiol.*, Sept., 1950, *23*, 534–541.

The authors present a method developed and used extensively at the Bristol Tracer Laboratory. Small doses (15–25 microcuries) of carrier-free I^{131} were injected intravenously to obviate the reliance on constant absorption from the gastrointestinal tract. Thyroid uptake was recorded for one hour from completion of the injection to get a true measure of the iodine avidity of the gland. Measurements later than this give a resultant of I^{131} uptake and mobilization of the protein-bound I^{131} from the thyroid. The avidity of the gland for the iodine is the most clear-cut expression of its functional state. It was thought that some relation between iodine avidity and urinary excretion might define thyroid function uniquely.

Preliminary investigations in animals were done to resolve various components of an area such as in the thyroid region; the thyroid, adjacent tissues, and vessels. The concentration of I^{131}, Na^{24}, and P^{32} in circulating blood was investigated as a function of time after intravenous injection by using two techniques: (1) multiple blood samples from a carotid artery cannula were analyzed, and (2) the blood was allowed to circulate around a polythene spiral, wound around a small gamma-ray counter and the count recorded with a kymograph. Statistical fluctuations were greater in the second than in the first method but gave a continuous record. The resulting curve showed a rapid initial uptake, and somewhat less rapid fall, interpreted as the mixing of the tracer

into the blood volume before loss by diffusion through the capillary wall became marked. The falling segment of this curve obeys an exponential law. This occurred in the first four minutes after injection. From four to fifteen minutes, the curve is indeterminate and this is where both mixing of the tracer with the blood and its appreciable capillary diffusion is thought to occur. From fifteen minutes to one hour, the curve again becomes exponential, representing solely the rate of removal of the tracer from the blood. Counts taken over the thyroid and liver show that a smooth uptake begins to occur only after the stage of removal from the blood has been reached, and only then can useful information be obtained.

A heavily screened gamma-ray counter, suspended and counterbalanced to maintain an accurate relationship to the patient was used to measure thyroid uptake of a tracer dose of I^{131}. The form of the uptake curve in humans was very similar to that seen in rabbits, as described above. Severe geometrical difficulties were encountered in measuring exactly the absolute amount of I^{131} or the proportion of the dose collected by the thyroid. The authors attempted to work this out by using rates of change as distinct from absolute amounts, and to adopt some method of normalization to correct for geometrical differences from patient to patient. The normalized uptake slope, a measure of thyroid avidity, is linked with the proportion of iodine dose utilized by the body through the measurement of urinary excretion of I^{131}. This method establishes a numerical scale of thyroid function which is independent of the particular counter used, the geometrical arrangement and the amount of the injected material. It is preferable to assess thyroid function by measuring its most essential biological activity directly and this is accomplished by using the tracer method.

These investigations were carried out on mental patients because of the dearth of information available on thyroid function as it relates to brain function. Border line cases of thyroid dysfunction will be the most benefited by the new method of study and alterations due to circulatory changes in the function and iodine metabolism of the thyroid cell may be distinguished. It has been previously shown that primary (thyrogenous) and secondary (pituitary) changes in thyroid function can be distinguished by the use of tracers.

In studying brain function by the use of tracers, P^{32} could not be used due to the low penetrability of beta particles. Only a small amount of iodine with gamma rays of low energy is concentrated in the brain which makes this substance of little value. Therefore, Na^{24} was used and a higher uptake was seen in the head than in the foot, probably due to differences in the circulation rate. Different areas of the head also showed rather marked variations in the rate of uptake. Interestingly enough, changes in posture and position radically influenced the concentration in the brain. Sodium uptake in mental patients was studied in an attempt to show a correlation between circulation rates in different body regions and to determine whether pathologic brain phenomena could be explained on the basis of altered rates of circulation in the brain. It is well known that the peripheral circulation in mental patients is very poor, particularly in schizophrenics, but this has never been measured. The use of Na^{24} makes such a study useful and accurate.—*K. L. Krabbenhoft, M.D.*

Marcus, R., and Rotblat, J. Diagnostic and therapeutic uses of radioactive isotopes. III. The application of radioactive isotopes in a case of multiple melanomata. *Brit. J. Radiol.*, Sept., 1950, *23*, 541–550.

Mice bearing melanosarcoma have been given dityrosine, a precursor of melanin, intravenously labelled with C^{14}. No selective affinity of the tumor tissue over other body tissues for the substance was noted. C^{14} has the disadvantage of a very long half-life to be practical clinically. Other investigators have found increased uptake in superficial melanotic nodules over normal skin using P^{32}.

The authors used tracer doses of P^{32}, I^{131}, and Cu^{64} to determine which element would be most efficacious in the treatment of diffuse melanomatosis. Cu^{64} was used because of the part it plays in melanin metabolism and the possibility that the melanin in melanomas might have a high copper content.

Cu^{64} was used in the colloidal metallic form. Five cubic centimeters of the colloidal solution containing 150 microcuries of Cu^{64} in 2.5 mg. of copper was injected intravenously. Lead collimated counters over melanomas and normal skin were used to measure the activity for about an hour and at intervals of one-half hour thereafter to check variations of activity with time. No difference in the rate of uptake or absolute uptake was noted between normal skin and the melanomas. Other areas of the body were counted and the liver was found to take up the greatest amount of Cu^{64}. By using a phantom, it was found that 82 per cent of the injected copper was taken up by the liver and retained there, at least for the two day period over which significant counts could be obtained. During this two day period, 7 per cent was excreted in the urine and 3 per cent was excreted in the feces. The remaining 8 per cent was apparently taken up elsewhere in the body. It was thought that continued excretion in the feces may occur but, due to the short half-life, this could not be determined. No toxic effects were observed from the injection of the Cu^{64}.

I^{131} was used because tyrosine is a precursor of melanin. In the form of an iodide, most of the I^{131} would be taken up by the thyroid, so it was ad-

ministered in the form of di-iodotyrosine. The radioactive iodine was not specifically concentrated by the melanomatous tissue.

One hundred and seventy microcuries of P^{32} was given in a solution of Na_2HPO_4 and its uptake in situ was similar to that of Cu^{64}. Due to the absence of gamma rays, Geiger-Müller counters were placed directly on the skin over the melanotic nodules, with lead diaphragms of varying sized orifices. It was found that the uptake in the melanomatous areas was four to ten times greater than in normal skin or uninvolved tissue. Blood and urine studies were also done and are to be published subsequently. Since these results were encouraging, two therapeutic doses of P^{32}, 5.4 millicuries and 15 millicuries, respectively, were administered to a patient with diffuse melanomatosis. It was found that the uptake in the melanomas was seven times greater than in uninvolved tissue and it was estimated that the weight of the melanomas constituted 1.5 per cent of the body weight, taking up 10 per cent of the injected amount of P^{32}. Necrosis was observed in an excised melanomatous nodule following the therapy. There was also clinical evidence of diminution in the size of some of the lesions. At autopsy, extensive necrosis was seen in the involved lymph nodes. Although the clinical course of the disease was not significantly altered, it appeared that some inhibition of the rate of growth was evident. Further study will be necessary to accurately assess the efficacy of this form of therapy.

Numerous tables, graphs, and photographs are presented to show the effects of the P^{32} on blood elements, liver function tests, urinary excretion, and the course of the disease.—*K. L. Krabbenhoft, M.D.*

Macgregor, Alastair G. Diagnostic and therapeutic uses of radioactive isotopes. IV. Radioactive iodine in the diagnosis of thyrotoxicosis. *Brit. J. Radiol.*, Sept., 1950, *23*, 550–553.

The author regards the use of radioiodine to be an important tool in studying the pharmacology and physiology of thyroid function. He has combined his results with recognized criteria for the diagnosis of thyrotoxicosis, such as clinical and laboratory methods. He feels that this method will find its greatest value in the intermediate group of cases, such as non-toxic goiter, anxiety states, and patients with suggestive thyrotoxicosis, with or without goiter.

The author summarizes the results in his group of 63 cases studied, except those with carcinoma of the thyroid. The distribution was as follows: normals, 12; non-toxic thyroid disease, 16; thyrotoxicosis and toxic adenoma, 31; and myxedema, 4.

Thirty microcuries of radioiodine was used as a tracer dose. Typical toxic curves are quick rising and start to fall in a few hours, due to the rapid turnover of iodine in the gland. Normal curves reach their maximum between twenty-four and seventy-two hours. In some non-toxic goiters, relatively high peaks are seen. This is thought to be due to iodine lack such as is seen in some pubertal goiters and in enlarging adenomas not evidencing toxicity. These adenomas are the ones that demonstrate the hot nodules of Means with the use of a collimated counter. Usually, this type of case shows a more slowly rising curve than is seen in the true thyrotoxicosis. The author states, however, that some obviously toxic patients have low peak curves, and this is usually explained on the basis of a previous thyroidectomy with removal of the major portion of functioning thyroid tissue. He has found that the curves of the intermediate group of non-toxic goiters overlap the curves of those with normal and and toxic thyroid metabolism.

In analyzing the twenty-four hour urine excretion curves, he has found that thyrotoxicosis is characterized by low values in the eight to twelve hour period, and hypothyroidism is characterized by high values in the twenty-four to forty-eight hour period.

Studies of plasma activity indicate the rate at which the plasma is cleared of circulating iodine by the thyroid, chiefly in toxic cases, and by the kidney in normal individuals. In the toxic gland, the plasma activity is due to the protein bound radioactive iodine returned to the circulation as thyroxin and exhibits a low level of activity at an early stage corresponding to the peak of thyroid absorption. Here, there is a secondary rise in the blood plasma level corresponding to the release of protein-bound iodine. In the normal individual, the minimum value of plasma activity is reached some time after twenty-four hours and the eventual level of activity is much lower due to the slower release of thyroxin. The conversion of administered radioiodine into the protein-bound form in normal individuals is a longer process and not as complete as that in toxic cases. From the measures of plasma activity, the author calculates the thyroid clearance rates which show fairly sharp differentiation between the toxic and non-toxic groups. From his experience, forty-eight hours following administration is the most suitable time to measure the total and protein-bound plasma activity. The inevitable variables in dealing with biological material is emphasized and further study will be necessary before the transition between normalcy and toxicity can be fully appreciated. Most important, it is felt that a real and gradual gradation of radioiodine diagnostic criteria probably parallels the clinical gradations seen.

A graph showing the plasma activity in typical cases after the administration of radioiodine is presented.—*K. L. Krabbenhoft, M.D.*

Paterson, Ralston. Diagnostic and therapeu-

tic uses of radioactive isotopes. V. The treatment of thyroid carcinoma by radioiodine. *Brit. J. Radiol.*, Sept., 1950, *23*, 553–556.

The author stresses that the use of radioiodine in thyroid cancer therapy is a completely new principle and that our previous principles of radiation therapy may not be applicable to this new method. Two processes occur simultaneously following the ingestion or injection of radioiodine. The first of these is the gradual absorption of the radioactive substance into the thyroid gland or into tumor functioning as thyroid tissue. While this is occurring, the circulating fraction of the radioiodine is delivering whole body irradiation. This may prove to be the limiting factor in determining the maximum dose which can be administered. A table is presented which shows the estimated whole body dose in roentgens with differing quantities of radioiodine. This shows that until doses of 100 to 150 millicuries are reached, there is a negligible percentage drop in the white blood count. In the higher doses a 20 to 25 per cent drop occurs. These results compare with those seen in simple regional roentgen therapy. The second process which occurs is the urinary excretion of the administered substance, usually complete in one to two days. This urinary excretion of iodine is only of interest from the point of view of recovery for re-use and because of disposal problems. The author states that he has been able to recover 90 per cent of the excreted iodine for re-use. Furthermore, by measuring the amount of iodine excreted an estimate of the amount absorbed by the gland can be compared with that calculated by other methods.

The amount of radioiodine selectively absorbed by tumor tissue in thyroid cancer has been found to be very small in the great majority of cases. However, the remaining normal thyroid tissue has a relatively high affinity for the radioiodine. Therefore, the author feels that before treatment can be considered, the normal thyroid tissue which prevents or lowers the tumor pick-up of radioiodine must be eliminated and this is accomplished in various ways. The first is surgical extirpation at which time an attempt is made to remove as much of the tumor as possible as well as the normal thyroid tissue. The second method consists of radioelimination of the normal thyroid tissue. This is used where surgical means is deemed inadvisable and a dose of 60–70 millicuries appears to have been adequate in most cases, to give total destruction. In the third method, excision followed by radioelimination is used. This is employed in cases where tracer tests subsequent to surgery show the removal of thyroid tissue to be incomplete. Only after elimination of the normal thyroid tissue can the therapeutic use of radioiodine be considered.

A single high dose of radiodine should be given, since the cancerocidal effect of the radioiodine will destroy the pick-up ability of the gland as well as its growth capacity. It has been suggested that only part of a tumor or one metastatic focus functions at any one time and it may be necessary to give a series of high dose treatments at intervals of six weeks or longer to destroy each focus of tumor growth as it becomes functioning.

The tumor frequently does not pick up radioiodine even after elimination of the functioning thyroid tissue. It is postulated that most of these tumors will eventually develop pick-up capacity under pituitary stimulus induced by the absence of circulating thyroxin. The following possibilities for inducing a pick-up capacity are mentioned: First, by deliberately keeping the patient myxedematous, the tumor may differentiate further in an attempt to supply the need for thyroxin. Second, use of thyrotropic hormone has been found unsuccessful. Third, it is thought that roentgen irradiation may produce differentiation of the tumor and thus induce pick-up capacity.

It is again emphasized that the entire study of radioiodine is experimental.—*K. L. Krabbenhoft, M.D.*

Warrington, H. C. Diagnostic and therapeutic uses of radioactive isotopes. VI. Results of treatment of thyroid cancer by radioactive iodine; a preliminary report. *Brit. J. Radiol.*, Sept., 1950, *23*, 556–559.

Twenty-one cases of thyroid cancer, 6 of which had received roentgen therapy prior to the advent of radioiodine, and all of which were recurrent, metastatic, or both, form the basis of this report.

First, a tracer investigation with radioiodine was done. In only 2 of 17 cases thus studied was conclusive evidence of tumor pick-up of the iodine demonstrated. Metastatic areas in these cases also exhibited concentrating ability. Subsequently, both of these cases were given radioiodine therapeutically following thyroidectomy. Four of the cases treated required immediate roentgen therapy and therefore were not included in this group.

In the 15 cases with non-functioning tumors, destruction or removal of the normally functioning thyroid tissue was attempted. Surgical extirpation, believed to be the method of choice, was successful in 2 cases. In 5 cases, radioelimination was used as a supplementary measure to surgical removal and as the sole means in 8 cases where surgical removal was contraindicated. This has resulted in 10 cases of obvious clinical myxedema and 4 cases showing excretion evidence of myxedema. The 1 remaining case died of extensive pulmonary metastases. Tracer studies were done in these cases every $1\frac{1}{2}$–2 months and as yet no tumor has developed concentrating ability. Roentgen therapy and thyrotropic hormone as used in 2 cases have not succeeded in producing significant change in iodine pick-up or excretion.

Pathologically, the author's cases show that in

general agreement with Seidlin's findings, highly differentiated tumors, particularly those with colloid formation, are more likely to pick up iodine, but not invariably.

Two cases are presented in some detail illustrating the above observations.—*K. L. Krabbenhoft, M.D.*

Walton, R. J. Diagnostic and therapeutic uses of radioactive isotopes. VII. Therapeutic uses of radioactive isotopes in the Royal Cancer Hospital. *Brit. J. Radiol.*, Sept., 1950, *23*, 559–566.

Only those patients in whom established surgical or radiotherapeutic techniques have nothing to offer are accepted for treatment with radioactive sodium, iodine, and phosphorus.

Na^{24} has been employed in the treatment of urinary bladder lesions. A spherical rubber bag containing the Na^{24} as the chloride in aqueous solution has been used as a surface applicator for lesions that involve a large area of bladder mucosa and show premalignant or malignant change, not more than a few millimeters in depth. Radon seed therapy is impractical here, and previously has required a full course of deep roentgen therapy or total cystectomy. The bag is inserted through the female urethra, but in the male a perineal urethrotomy is necessary. Inert sodium iodide solution is first instilled to determine the amount of solution desired. The Na^{24} is then inserted and left for the desired time. The volume of the sphere and the activity of the solution determine the dose. A dose of 3,000 roentgens gamma radiation appears to have been satisfactory. Beta radiation produces 1.4 times the gamma radiation, dose at the surface of the bag and Br^{82} has been substituted with the purpose of decreasing the amount of beta radiation. A case is cited in which a low grade papillary carcinoma completely disappeared after such treatment. Monthly cystoscopies are done to note the progress of healing.

I^{131} is used where (1) the thyroid can be shown to take up the element, and (2) the cancer is not susceptible, because of dissemination, to treatment by other methods. A diagnostic dose of 50–100 microcuries I^{131} is administered and if this study shows concentration in the body, a therapeutic dose is given. The highest such dose has been 230 millicuries and this has had negligible effects on the hemopoietic system, and gastric and vesical mucosa. Patients are discharged when the urine content has fallen to 6 microcuries per day or 0.0055 microcurie per cc. An interesting case report is given.

P^{32} is used in the treatment of polycythemia vera as has been accepted at this point. An initial dose of 5 millicuries and in four to six weeks a second dose of 3 to 4 millicuries is given. P^{32} in small amounts intravenously has produced some response in rapidly growing tumors, such as chronic leukemia, lymphosarcoma, and anaplastic carcinoma. These results are frequently quite dramatic. A case is reported in which a lymphosarcoma of the stomach, later developing skin metastases, showed remarkable response of the skin lesions to P^{32}. In this case, the estimated tumor dose was only in the region of 80 equivalent roentgens per gram.—*K. L. Krabbenhoft, M.D.*

Blomfield, G. W. Diagnostic and therapeutic uses of radioactive isotopes. VIII. The use of radioisotopes in therapy. *Brit. J. Radiol.*, Sept., 1950, *23*, 566–568.

Ten cases of thyrotoxicosis are reported. Indications for treatment are: (1) lack of response or development of toxic symptoms, following thiouracil drugs or in which permanent remission is not obtained after two years; (2) patients suitable for surgery, but where risk is high or permission is refused; and (3) patients who have had a thyroidectomy and have not subsequently responded to thiouracil.

Patients were selected in older age groups with the consideration that late effects of the radiation have not been ascertained. Dosage is estimated on the basis of peak uptake and biological half-life as estimated in the preliminary tracer dose and on the basis of estimated gland size. It is felt that a reasonable assessment of dosage can thus be made. An attempt is made to deliver 10,000 equivalent roentgens to the gland.

In 7 of the 10 cases a good response ranging from temporary myxedema to varying degrees of improvement of the thyrotoxic symptoms has occurred and 2 of these are euthyroid. Three cases have been followed only a short time since treatment and the results cannot as yet be evaluated.—*K. L. Krabbenhoft, M.D.*

Freedberg, A. S., Chamovitz, D. L., Ureles, A. L., and Van Dilla, M. A. The direct measurement of I^{131} uptake in the thyroid gland; further observations. *J. Clin. Endocrinol.*, Aug., 1950, *10*, 910–932.

The authors present a new method for the quantitative measurement of thyroid gland uptake of I^{131}. They use four copper cathode Geiger-Müller tubes connected in a parallel electrical circuit and arranged horizontally in a circle with a radius of 45 cm. Each tube is shielded with a 2 inch lead box which increases its sensitivity.

They found that there was a linear relationship between the net counts per minute and the amount of I^{131} up to a counting rate of approximately 60,000 counts per minute. Above this the net counting rate fell below the expected rate.

Various experiments were performed to assess the effects of absorption and scatter on the measurements of thyroid gland sources of I^{131}. These experi-

ments showed that the determination of thyroid gland uptake is in excess by about 8 per cent for the four tube method and approximately 20 per cent by the single tube method.

Counting over the thyroid gland following 100 to 150 microcuries tracer doses of I^{131} was performed. Thyroid gland uptake %

$$= \frac{\text{net counts/min. thyroid gland}}{\text{cc } I^{131} \text{ sol. administered}} \times 100$$

$$\frac{}{\text{cc } I^{131} \text{ sol. in standard}} \times \text{net counts/min. standard}$$

The influences of various non-thyroid sources of I^{131} on its measurement in the thyroid were measured. It was found that they were less than for the effect of scattering and absorption in the thyroid and tissues of the neck. In twenty-four hours the amount of I^{131} circulating in the blood was 1.5 per cent of the total administered. Error due to I^{131} in the urinary bladder was estimated to be 2 per cent. The counting rate from indifferent areas equal in volume to the neck (usually the low thigh region) was also determined. In the thyrotoxic patient six hours following a tracer dose, the radiation from the thigh was 0.5 per cent of that from the neck.—*R. A. Hays, M.D.*

Pluygers, Eric. Carcinomatose pleurale traitée par l'or radioactif (Au^{198}). (Pleural carcinomatosis treated with radioactive gold [Au^{198}].) *J. belge de radiol.*, June, 1950, *33*, 156–170.

In order to be of any clinical value, a radioactive isotope must fulfill the following requirements:

1. The half-life must be short and there must no contamination with long half-life isotopes. The optimal value of half-life is three to eight days.

2. The half-life must not be too short since in that case the radioactive material would have to be used immediately after production or, if shipped away, large initial quantities of radioactive material would be required in order that a sufficient amount of radioactivity is retained at the time of treatment. This would necessitate elaborate protection.

3. The biological behavior of the isotope used must be known.

4. The chemical properties must also be well understood.

5. It is important to know whether the isotope is a beta or a gamma emitter and, in case of both, what proportion of each is emitted. The penetrating power of the radiation must also be known. Adequate protection must be provided.

6. The affinity of the used isotope toward the tissue to be treated should be well established.

7. If the isotope is toxic, only amounts of very low toxicity should be used.

8. The cost of production and shipment must not be too high.

Radioactive gold (Au^{198}), with a half-life of 2.73 days, seems to fulfill all of these requirements. It is a beta and gamma emitter. The gamma radiation is of rather low energy. Clinically it is used as a colloidal suspension and has a marked tendency to remain where it was injected.

One case of carcinomatosis of the pleura is presented. The diagnosis had been established in August, 1947, and the patient was still alive at the time of publication of this article in June, 1950. He was treated with roentgen therapy without much success and later on with nitrogen mustard injected in the pleural cavity, again without result.

In November, 1949, a first course of intrapleural colloidal gold was given, the dose amounting to 5 millicuries. Two weeks later, a redness having all the characteristics of the erythema commonly seen after roentgen therapy was noticed on the skin of the thorax. This subsided after about two more weeks. The pleural effusion did not reaccumulate as fast as previously.

A second course of treatment was given at the end of November, 1949, using 19.48 millicuries of radioactive gold. This was well tolerated by the patient. The treatment was supplemented by a small amount of radiation to the right hemithorax. The patient was discharged physically and subjectively in better condition.

By March, 1950, the patient had considerably improved. At that time 12 millicuries of radioactive gold was injected, followed by 20 millicuries three weeks later. The patient was discharged on April 15, 1950. He is not entirely symptom free but excellent palliation has been achieved.

This case report is extremely interesting, first, because of the exceptionally long survival after the onset of pleural carcinomatosis and second, because of the good paliation obtained by injections of radioactive colloidal gold in a case where roentgen therapy and nitrogen mustard were practically unsuccessful.—*J.-P. Jean, M.D.*

Ray, C. T., Burch, G. E., Threefoot, S. A., and Kelly, F. J. The distribution of radiomercury of a mercurial diuretic in some of the body fluids of man. *Am. J. M. Sc.*, Aug., 1950, *20*, 160–165.

During the course of experiments with mercuhydrin labeled with $Hg^{203,205}$ various studies were made on the distribution of radiomercury in edematous fluid, ascitic fluid, pleural fluid, bile, saliva, gastric juice, cerebrospinal fluid, sweat and washed erythrocytes. Two cubic centimeters of the mercurial diuretic were administered intravenously, each cubic centimeter containing 39 mg. of mercury. The radiomercury had an activity such that 8 to 20 million counts per minute were introduced. Rela-

tively high concentrations of mercury were excreted in the bile varying in different samples from 2.7 to 7.2 per cent of the intravenously injected dose. Most of the balance of the injected mercury was recovered in the urine. No measurable quantities entered the cerebrospinal fluid, sweat, gastric juice and erythrocytes, and only low concentrations were found in the saliva, edema, peritoneal and pleural fluids.—*S. G. Henderson, M.D.*

MISCELLANEOUS

Lansbury, John, Smith, Lawrence W., Wulzen, Rosalind, and van Wagtendonk, Willem J. Relation of the "anti-stiffness factor" to collagen disease and calcinosis. *Ann. Rheumat. Dis.*, June, 1950, *9*, 97–108.

"The anti-stiffness factor" is a fat-soluble vitamin which regulates phosphorus metabolism. This paper reports studies on the possible relations of this factor to human disease. The nature of the active principle is still unknown.

The crude sources of this factor are green vegetables, raw cream, unheated molasses and raw sugar-cane juice. Animal experiments previously reported by others described development of atrophy of skeletal muscles, rigidity of the animals and calcium deposits between muscle fibers, around joints, and under the skin as result of deprivation of this factor. It was thought that this may be a factor in human calcinosis and scleroderma. Calcinosis is described in two forms: (a) circumscribed calcinosis generally associated with scleroderma; and (b) interstitial calcinosis. Both forms are shown on roentgenograms of guinea pigs deprived of the anti-stiffness factor. These roentgenographic findings are very similar to those of 2 cases of human calcinosis described.

A clinical trial of treatment with the anti-stiffness factor in 10 cases of scleroderma, with and without calcinosis, resulted in improvement in 4 cases. The treatment was, however, less effective than older treatments already in vogue.

The studies suggest the possibility of a nutritional factor in the pathogenesis of some of the collagen diseases.—*P. R. Dirkse, M.D.*

Cutler, Sidney J. The role of morbidity reporting and case registers in cancer control. *Pub. Health Rep.*, Aug. 25, 1950, *65*, 1084–1089.

That no community can effectively prevent or control disease without knowledge of the number, location and characteristics of the cases is generally accepted.

The authors outline and give suggestions as to how a complete case register can be obtained and made useful as a complete record of each case.

A properly planned program gives incidence, prevalence and information as to stage of the disease and in case of cancer the primary site. Such information is useful both as a means of professional and lay education.—*V. L. Peterson, M.D.*

Janker, R. Ein Universal-Schichtaufnahmegerät. (A universal planar roentgenographic apparatus.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, July, 1950, *73*, 253–261.

A new planar roentgenographic device with the scope to visualize section in planes perpendicular to the longitudinal axis of the body and to the sections represented in conventional planar roentgenography is described.

Reproduced films showing transverse sections of the thorax show relatively good detail and might prove a useful diagnostic help. The apparatus can be used for routine roentgenographic work and planar roentgenography in both the vertical and horizontal planes. For technical details, the original article should be consulted.—*K. E. Matzinger, M.D.*

Broman, Tore, Forssman, Bengt, and Olsson, Olle. Further experimental investigations of injuries from contrast media in cerebral angiography; summation of various injurious factors. *Acta radiol.*, July–Aug., 1950, *34*, 135–143.

In earlier experimental studies it was shown that various contrast media of the diodrast group and intended for use in cerebral angiography are capable of injuring the cerebral vessels of laboratory animals. The injuries were manifest in the form of a disorder in the permeability of the cerebral vessels, edema, stasis, and punctate hemorrhages. An impairment of the permeability only is the mildest form of such injuries. It was observed that the incidence and the degree of severity of the vascular lesions varied according to the concentration of the medium used and to the application time, i.e., the time the medium was allowed to act upon the cerebral vessels.

In clinical cerebral angiography the contrast medium often comes into contact with blood vessels in areas with pathologically altered brain tissue. Therefore, the authors thought it of interest to try to find out whether other factors might play a contributory part in the causation of disorders or lesions to the cerebral vessels incidental to cerebral angiography. It was thought that under certain pathological conditions through a summation effect otherwise non-injurious concentrations and application times of the contrast agents would be capable of damaging the cerebral vessels. The present study is based on this hypothesis.

Summary. Repeated injection of a contrast medium into the carotid artery involves a risk of a summation effect if the interval between the individual

injections is short. Even slightly toxic contrast media are injurious if injected in this manner.

Retardation of the circulation in the brain will prolong the application time and lead to an injury, even though the contrast medium is injected fairly quickly.

Latent vascular injury in the brain is likely to be aggravated and become manifest by the injection of a contrast medium of the diodrast type in cerebral angiography. This was demonstrated experimentally by injecting another chemotoxic substance in an otherwise non-injurious quantity immediately before, or simultaneously with, the injection of the contrast solution. Certain cerebral disease processes may presumably have a similar effect.—*Mary Frances Vastine, M.D.*

TOD, MARGARET. Preliminary notes on an experiment with skin erythema produced by x radiation. *J. Faculty of Radiologists*, July, 1950, *2*, 43–50.

An experiment was undertaken in attempting to find a quantitative method of recording human skin erythema which would allow a scale to be used for comparison of the degree of erythema produced by different doses of radiation. Seventy-five normal subjects of both sexes and varying ages were used —employing three fields, 3 cm. in diameter, on the flexor aspect of the left forearm. Factors: 140 kv., filter 2 mm. Al, focal skin distance 15 cm., half-value layer 3 mm. Al. All three fields were treated on the same occasion, using single doses varying from 100 r to 1,600 r.

In summarizing, the author states that erythema appeared within twenty-four hours in 70 per cent of cases treated with 200 r and over. Except with very low doses it was brightest about the fourth week. The latent period was not much affected by doses of 400 r and over. The lowest dose employed, 100 r, produced no erythema in 6 subjects. The lowest dose to produce visible reaction was 200 r which produced transient erythema in 3 subjects. Doses up to 450 r produced erythema in forty-three out of seventy-nine fields. Doses of 450 r and upward produced reactions in all subjects treated. In some subjects its appearance was delayed. The 50 per cent skin erythema dose under the conditions of this experiment was 275 r. Duration of erythema except with very low doses was six to eight weeks with only slight changes in degree. Moist desquamation resulted in five fields treated with doses between 1,200 and 1,600 r, being five out of forty-eight fields so treated. No subject had this reaction on more than one field. After one year seventy-nine out of ninety-eight fields treated with 800 r and over showed visible changes, and of those treated with 900 r and over, sixty-three out of seventy still showed radiation effects after two years. Those treated with 800 r or less were invisible after two years. Sensitivity to varying dosage was enough to make steps of 200 r clearly visible. Steps of 100 r could usually be distinguished,—*S. G. Henderson, M.D.*

HOLT, MARGARET W. A semiautomatic injection apparatus for use with radioactive solutions. *Science*, Aug. 4, 1950, *112*, 142–143.

The author describes a device suitable for injection of unanesthetized experimental animals by remote control, to be used when the radioactivity of test materials is of an intensity dangerous to personnel. The tip of a syringe, with needle attached, is passed thorugh a simple perforated suction device. On application of suction by remote control, the skin is forced up against the needle tip, automatically making the puncture. With the aid of an extension rod to the syringe plunger, injections at considerable distances could be made.—*H. P. Brean, M.D.*

KIMELDORF, D. J., JONES, D. C., and FISHLER, M. C. The effect of exercise upon the lethality of roentgen rays for rats. *Science*, Aug. 11, 1950, *112*, 175–176.

The authors note previously recorded evidence to indicate that conditions tending to increase the metabolic rate also increased the lethal effects of roentgen rays. To investigate further the role of metabolic level in determining radiosensitivity, the authors performed an experiment using vigorous exercise as a means of increasing the metabolic rate. A standardized exhaustive exercise test was used with rats as the experimental animals.

After irradiation with 600 r all non-exercised irradiated rats survived while 50 per cent of the exercised irradiated rats died. A dose of 700 r resulted in 44 per cent mortality of non-exercised animals and 92 per cent mortality among exercised animals. With a dose of 860 r non-exercised animals showed 83 per cent mortality, exercised animals 100 per cent mortality. In the exercised animals symptoms appeared sooner and postirradiation survival time was much shorter. Further experiments proved that the mortality was increased only if the exercise was given after irradiation.

The authors conclude that their experiments furnish additional evidence of the relationship between radiosensitivity and metabolic level.—*L. K. Sycamore, M.D.*

GRAHAM, J. B., and GRAHAM, R. M. The modification of resistance to ionizing radiation by humoral agents. *Cancer*, July, 1950, *3*, 709–717.

A number of agents which have been demonstrated experimentally to augment or diminish the radiosensitivity of tumor and normal tissues are reviewed. The effects of several humoral agents injected into Swiss mice with subsequent total body irradiation

(400 r) were studied by these authors. Proper controls were used and unrelated factors were kept constant. The radioresistance of the experimental rodents depended upon the type and dose of the agent given, and the time of administration in reference to the time of irradiation.

The results indicated that horse serum (foreign protein) administered before irradiation protected both the male and the female, but had little effect when given in the post-irradiation phase. Estradiol benzoate and estrone produced similar effects, rendering both male and female more resistant when given before irradiation. Less resistance was encountered in the male by pre-irradiation medication of stilbestrol while post-irradiation doses protected the male. The male was more vulnerable when testosterone was given after irradiation. Adrenal cortical extract enhanced the radioresistance of the male and female when given prior to, and decreased the resistence when given after irradiation.

The irregular pattern produced by the gonadal hormones indicates that radiosensitivity is not a primary gonadal activity. However, the investigators produced 100 per cent mortality by irradiating ovariectomized mice as opposed to a 48 per cent mortality in irradiated control mice. This suggests a significant role of the gonads in modifying the effects of ionizing radiations.

A study of the adrenal cortex and the effects of adrenal cortical extract disclosed that this structure had little to do with the resistance to irradiation, although its activity and size was directly responsible to ionizing rays.

It was noted that vaginal smears from the irradiated mice showed the same cytologic changes as seen in the vaginal smears of humans being treated for cervical carcinoma. Also, the cellular reactions demonstrated on oral, rectal, and vaginal smears from the irradiated mice paralleled the subsequent mortality rate. Thus a study of the cellular reactions of the normal tissues is an index to radiosensitivity and is of prognostic value. The alterations in cellular composition could be duplicated by the injections of various non-toxic agents into the mice, which the authors label as a "sensitization response." The mice showing the greatest incidence of sensitization response had the highest mortality when subsequently exposed to ionizing radiation, indicative of a summation effect. Neither the ovaries nor the adrenals were essential for the production of the sensitization response.

The authors conclude that the radiocurability of cancer is related to the common sensitivity of the normal and abnormal tissues, and that the response of the normal tissue is of prime importance prognostically.—*J. W. Wilson, M.D.*

Ernst, H. W. Über die Röntgen-Toleranzdosis. (The roentgen tolerance dose.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, July, 1950, *73*, 362–370.

The author refers to the confusion of about the roentgen tolerance dose in various countries in regard to amount and the time factor. As an example the tolerance dose in Germany is 0.25 r per day; in Sweden it is 0.1 r per week; in the United States, 0.3 r per week; and in England, 0.5 r per week.

The author believes that the so-called roentgen tolerance dose should be subdivided as follows:

I. Dose of genetic injury, corresponding to the integral dose (expressed in r), the lower time limit of which lies before the birth of the affected subject, whereas the upper time limit would coincide with the point after which no offspring would be possible or could be expected. Thus, the effect of this dose becomes noticeable in later generations on a hereditary basis. Appropriate figures for the human being are not known as yet.

II. Dose of general injury, corresponding to a dose below which a human being is not objectively damaged. For many organs the threshold may be zero, for others relatively high.

III. Tolerable dose. This is the dose through which a human being is not subjectively damaged; that is, the injury is not apparent to himself. Like the dose of general injury, it represents a threshold value, but having a definite higher level.

IV. Tolerable dose rate. This is expressed in r/sec. (or more exactly in erg/sec.), representing the dose rate which when acting continuously (24 hours per day, 7 days per week, etc.) would be so balanced by the recovery that subjectively no disturbance is noted. It is unknown whether such a value exists, let alone its magnitude.

V. Permissible average dose. In view of the fact that no tables of the tolerable doses are available, the necessity arises to express, by simplifying the underlying conditions, the maximum permissible dose (peak value) or the average dose. This latter would constitute a measure of the integral dose received through all the years spent in roentgen service. A distinction should be made in the future between soft and hard radiation.

VI. Permissible average dose rate. This represents the permissible average dose/time. The following table is suggested.:

	Hard Radiation	Soft Radiation
Life	200 r	500 r
Year	6 r/yr.	15 r/yr.
Week	0.15 r/wk.	0.35 r/wk.
Day	0.03 r/d.	0.065 r/d.
Hour	0.006 r/hr.	0.025 r/hr.
Minute	0.0001 r/min.	0.0004 r/min.

VII. Permissible maximum dose. For the control of the working conditions in a roentgen institute, it is more suitable to use a reproducible dose which could be given per day under maximum use of the appa-

ratus with maximum time of exposure to the personnel. This dose would have a different value for the various parts of the body. The following safe daily values are suggested:

	Deep Therapy	Diagnosis
General	0.1 r	0.2 r
Hands	0.2 r	0.3 r
Abdomen	0.05 r	0.1 r

VIII. Actual maximum radiation quantities. This dose refers to the actual radiation (expressed in r/day) received on certain parts of the body, if, for example, on a certain day a larger dose was received and on others no exposure at all. One can estimate the dose that would be permissible, say, in one week.

IX. Normal dose rate. This, in fact, has nothing to do with tolerance dose, but is used for standardization of apparatus by the manufacturers. It is expressed in r/sec. or r/min. and corresponds to the value which is determined as being normal at a certain distance from the apparatus to afford the necessary protection.—*H. P. Mueller, M.D.*

Batho, Harold F. X-ray protection. *J. Canad. A. Radiologists*, Sept., 1950, *1*, 48–51.

The author defines a tolerance dose of radiation as that dose below which level the natural processes can repair completely the damage sustained. He points out, however, that there is no tolerance dose for genetic injury, Genetic injury is proportional to the total exposure. The tolerance dose therefore depends on the threshold for injury of an exposed individual and a decision as to what constitutes a tolerable risk for genetic injury. The Canadian standard is now 0.5 r per day or a total of 0.3 r per week. The writer makes an interesting comparison in that over a fifteen year period a radiologist receives a total of 220 roentgens which is estimated to approximate that sustained by fertile survivors of the atomic explosion in Japan.

The aspects of exposure in radiological work of course differ in roentgenography, fluoroscopy and therapy, but all can be considered under three headings: (a) direct beam, (b) direct radiation transmitted through the tube shield, and (c) radiation scattered from the subject in the path of the direct beam and from the walls and floors of the room.

In diagnostic roentgenography the author quotes the average findings of several investigators in the exposure at various positions from the tube. When the exposure is 2.5 r on the patient, the exposure at 6 feet is 0.4 r. With the portable apparatus the writer recommends that the amount of work be limited to 15,000 ma. sec. per week, if a shielding apron is not worn. With a lead apron this factor can be increased by 5. The author also notes that in the use of photofluorographic equipment there is marked increase in the amount of radiation per film over ordinary chest roentgenography. In fluoroscopy it is essential that the radiologist and the technician wear lead shielding. It is probable that the palpating hand will suffer overexposure even though shielded with a lead glove when placed in the direct beam after it has passed through the patient. In therapy as it is not practical to carry enough shielding on the tube head for complete protection, it is essential that the operating personnel be out of the room with additional lead shielding at a minimum distance of 6 feet from the tube.

The author emphasizes that actual exposure of all operating personnel should be measured with a radiation survey and personal monitoring. The measurements should be made in the most unfavorable locations preferably with an ionization chamber. In the use of film badges the author advises the use of government or commercial film services which give accurate comparisons of film densities with known measured quantities of radiation.—*T. D. Allison, M.D.*

Lauritsen, C. C., and Lauritsen, T. A radiation meter for disaster use. *Science*, Aug. 4, 1950, *112*, 137–140.

The evident possibility of deliberate radioactive contamination of population centers as a method of future warfare makes it advisable to have an effective warning device generally available. Since harmful or even fatal intensities of radioactivity, induced by atomic explosion or by dusting with radioactive by-products, are undetectable to the unaided senses, decisions for abandonment procedure, rescue operations, or re-occupation will probably be based largely on direct measurements of environment radioactivity. Meters now available, designed originally for clinical or experimental work, are delicate, complex, and unnecessarily sensitive for military needs.

The authors suggest that meters for defense purposes be simple, rugged, capable of mass production, and considerably less sensitive than laboratory meters now in use. They have designed a low-capacity electrostatic voltmeter, mounted in a rugged ionization-chamber case, with a friction charging device. A stiff but light aluminum needle comprises a pivoted indicator, to which is applied a spiral restoring spring. Sensitivity is approximately 500 volts for 20° deflection. The entire unit is about the size of a pack of cigarettes. While it is clear that a complete solution of the problem of evaluating radiation hazards in wartime is a complicated affair, the authors believe that this or a similar meter, widely available to the population, may be a useful and effective device in radiation disaster.—*H. P. Brean, M.D.*

Ham, W. T., Jr., and Trout, E. Dale. Million-volt beryllium-window x-ray equipment for biophysical and biochemical research. *Radiology*, Aug., 1950, *55*, 257–270.

An investigation was made of the physical characteristics of the roentgen beam emitted by a 1 million volt beryllium-window tube at distances ranging from 15 to 150 cm. from the source. Both red bakelite and black nylon thimble chambers were used. Red bakelite chambers are only adequate over a range of wavelengths from about 0.1 to 1.0 angstrom as have been used in conventional medical practice. Beryllium-window tubes allow transmission of very long wavelengths; perhaps greater than 6 to 8 angstroms.

Beta particles penetrate the walls of nylon thimble chambers placed near the beryllium-window, causing these chambers to read much higher than comparable red bakelite chambers. It is believed that surface tissue dosage near the beryllium-window can be estimated more accurately with nylon chambers than with bakelite chambers.

The equipment consisting of a million volt generator and the beryllium-window roentgen tube is described.

The physical characteristics of the beam are discussed and absorption curves in various media are plotted.

Finally a detailed account of water absorption experiments is presented with the conclusion that this method shows promise as a possible means of determining dosage rate of short focal distances from beryllium-window roentgen tubes.—*E. E. Seedorf, M.D.*

Rawlins, F. Ian G. The intensification of the fluorescent image in radiology. *Brit. J. Radiol.*, Aug., 1950, *23*, 460–464.

Improvement in the fluoroscopic image would be of value for several reasons, among which are: (a) a smaller dose to the patient; and (b) elimination of the necessity of adaptation. It is shown that because of the nature of the eye, improvement cannot be accomplished by optical means, but must come about by brightness intensification. In other words energy must be brought into the system from outside.

Progress has been made in the development of at least three types of brightness intensifiers. In order to be of value, the intensification should be of the range of one hundred times. In one type, developed by Coltman, an electron-accelerator tube, provided with three phosphors, forms the essential unit. Magnetic focusing is provided, and the potential across the tube is 15 kv. One screen activates the next one, and a final amplification of twenty times is achieved.

A second plan developed by Coltman depends on electrostatic focusing with reduction of the image size. The bright image is subsequently enlarged optically with an apparent intensification of five hundred times.

A third plan, developed by Moon, is essentially a scanning tube with a fine beam passing through the patient to a screen, with the photo-electric current subsequently amplified and brought to a kinescope.

In all of these systems further amplification may be accomplished by television apparatus, and in some cases this would have the further advantage of eliminating inconvenient position of the viewing screen. It would also protect the fluoroscopist but make palpation difficult.—*E. F. Lang, M.D.*

Titterton, E. W. Neutron dose determination by the photographic plate method. *Brit. J. Radiol.*, Aug., 1950, *23*, 465–471.

Since knowledge of the tolerance dose of fast and slow neutrons is not known, an attempt has been made to determine the exposures received by individuals working near neutron sources. Equipment for making flux surveys is bulky and specialized and a compact inexpensive apparatus for determining integrated dosage is necessary. Specially prepared photographic plates have been found relatively accurate, convenient and economical.

The emulsion has incorporated in it lithium and boron. Reactions of slow neutrons with the nuclei of these atoms produce tracks in the emulsion which after development can be counted with a microscope. Boron-loaded emulsions have been found more satisfactory.

Determination of the dose of fast neutrons is more difficult. The same type of plate is used, and either the number of fast neutron fissions or the number of proton recoils is counted. Because the length of the track varies considerably with variation in the energy of the neutron beam, a monochromatic beam can be much more accurately measured. When there is a heterochromatic beam, and when many slow neutrons are present, exhaustive investigations are necessary to determine the standards for quantitative measurements in each case.—*E. F. Lang, M.D.*

Macarini, Neopolo. Le indicazioni della stratigrafia 1930 raffrontate a quelle della stratigrafia 1947. (The indications of planar roentgenography of 1930 as compared with those of planar roentgenography of 1947.) *Ann. radiol. diag.*, 1950, *22*, 83–113.

The author formulates indications for the use of planar roentgenography developed in 1930 and for planar roentgenography developed in 1947 which is employed to give transverse axial views of the chest. Such examinations may be carried out separately or in conjunction with routine roentgenograms of the chest. The ordinary planar roentgenogram he finds most useful for accurate analytical examination of pathological diseases in the chest. When a more accurate localization of the lesion

becomes necessary for surgical intervention, then the transverse axial planar roentgenogram is more important.

To illustrate these points he uses 3 cases: a case of multiple tuberculous cavities, a primary malignant tumor of the lung, and a case of echinococcus cyst of the lung. These cases are well illustrated by reproductions of the original films. The bibliography includes the world literature on this subject.

To understand the technique of the transverse axial planar roentgenogram, it would be necessary for one to refer to other articles on this subject.—*P. E. Russo, M.D.*

Seelentag, Walter. Eine Methode zur genauen Bestimmung der erforderlichen Schnitthöhe bei Schichtaufnahmen scharf konturierter Objekte. (A method for the exact determination of the desired level in planar roentgenography of sharply delineated objects.) *Fortschr. a. d. Geb. d. Röntgenstrahlen ver. m. Röntgenpraxis*, Aug., 1950, *73*, 492–500.

The author describes a new method for measuring the exact level of a lesion for demonstration by planar roentgenography. The waste of time and films necessary to find the correct level in the usual type of body-section examination is eliminated, since only one preliminary exposure is necessary. A double exposure is made of the lesion in question with the tube at an angle of 10° cranial and caudal from the midposition of the tube. The distance between corresponding points of the object is measured and the level determined directly from a graph.

A few illustrations demonstrate the practical use of this method.—*F. M. Reis, M.D.*

Mattsson, Ove. Film-faults caused by contact between roentgen films during the development. *Acta radiol.*, Sept., 1950, *34*, 166–176.

The author describes and explains the genesis of some types of film faults caused by contact between films during the developing process. These film faults involve only one of the two emulsion layers. To verify the location of the defect both sides of the film must be examined by studying the light reflexes. A layer surface with reduced density reflects more light and seems to be clearer when it is inspected in reflected light. The properties of the emulsion can be easily studied under the microscope. The surface of the areas with very high density and a large quantity of silver is very irregular. Small hills, corresponding to superficial groups of silver grains are seen. Areas with less density show a smoother surface. The gelatin in the emulsion is evidently contractible and where no silver has been reduced the gelatin contracts after processing to a homogeneous mass with a regular smooth surface. It reflects the light much better than the irregular surfaces or areas with high density. Thus it may be seen why a reduced density localized to only one of the two layers is easily discovered by examination of both layers in direct light by study of the light reflexes.—*Mary Frances Vastine, M.D.*

Breck, Louis W., and Maylahn, Donald J. New simplified technic for localization of foreign body. *Arch. Surg.*, Sept., 1950, *61*, 589–592.

Radiopaque foreign bodies are localized by use of a small piece of metal wire and roentgenograms. The metal wire acts as a movable landmark and its position with relation to the foreign body is determined by roentgenological studies.—*A. E. Imler, M.D.*

Vallebona, A. Axial transverse laminagraphy. *Radiology*, Aug., 1950, *55*, 271–273.

With the aid of a sketch the author demonstrates how the roentgen beam is directed obliquely to the center of the desired cross section of the body and reaches a film which is carried on a horizontal platform. This platform rotates simultaneously and in the same direction as the patient during the exposure. The patient and the film turn 360 degrees during each exposure and the time can vary from one-half to several seconds.

Transverse laminagraphy has been found useful in the study of the chest and mediastinum, and may be applied to other levels of the body.—*E. E. Seedorf, M.D.*

Haley, Thomas, Mann, Samuel, and Dowdy, Andrew. A comparison of the response of normal and hypothyroid mice to acute whole body roentgen radiation. *Science*, Sept. 22, 1950, *112*, 333–334.

The purpose of this experiment was to determine the response to whole body irradiation following the administration of thiouracil and its derivatives. It was noted that there was little difference in the susceptibility of normal and hypothyroid animals to roentgen irradiation indicating that the hypothyroid state confers no real protection to the animal.

Zondek has shown that there is very little difference in oxygen saturation and oxygen tension in the normal and the hypothyroid states, and that the oxygen disassociation curves in both states are almost identical. Thus, it is possible that the amount of free oxygen, and not its rate of utilization determines the extent of damage produced by roentgen irradiation.—*F. H. Squire, M.D.*

del Buono, Giuseppe. Ricerche sperimentali sulla patogenesi del male da raggi. (Experimental investigation on the pathogenesis of

roentgen sickness.) *Arch. de radiol.*, 1950, *26*, 38–52.

The author has administered roentgen therapy to rabbits, giving 200 r per day with the following factors: 165 kv., 3 mm. Al., 3 ma., 50 cm. distance. These treatments were repeated daily until the animals died.

One group of rabbits was given total body irradiation and the average lethal dose was 1,500 r. The average fall of the white blood cell count was from 8,500 to 3,500.

The second group was irradiated only over the liver. The average lethal dose was 5,500 r and the white blood cell count fell to 3,500.

The third group was irradiated over the spleen only. The average lethal dose was 5,500 r. The white blood count fell only to 6,500.

The fourth group was irradiated over the hypogastrium. The lethal dose was 5,500 r.

A few days after the beginning of the irradiation, all these animals began to be less active and their activity decreased in the following days. They lost their appetite, and occasionally vomited. They all developed persistent and progressive diarrhea. At autopsy the most uniform finding was an acute colitis. It must be noted here that the author does not mention the number of animals used in his experiments and that no other studies aside from the blood counts and the postmortem examination were done.

After noting that the principal symptom preceding death was diarrhea, the author discusses the reasons for this and reaches the conclusion that local as well as general reactions to irradiation are due to the liberation of histamine or of histamine-like substances. He gives no facts to support this conclusion. —*Cesare Gianturco, M.D.*

Langner, Paul H., Jr., and Atkins, Joseph P. Intrabronchial electrocardiography; a preliminary report. *Circulation*, Sept., 1950, *2*, 419–421.

The authors present a preliminary report of their experiences with the use of an intrabronchial electrode. They seek to ascertain if the lungs may be considered a homogeneous volume conductor.

Four anesthetized dogs were used and a No. 8 ureteral catheter with an electrode at its tip was passed into various parts of the bronchial tree. In 5 of the human subjects used, the passage of the electrode was accomplished by the use of a laryngoscope. In these cases the electrode consisted of a bronchial forceps insulated except at its tip. A No. 8 ureteral catheter insulated to its tip was passed without instrumentation in 5 subsequent human subjects, and the position of the electrode tip checked by fluoroscopy and by anteroposterior and lateral roentgenograms. Basal sedation was obtained in the human subjects with pentobarbital and 1 per cent cocaine used topically. The importance of the position of the body and of the phase of respiration being kept constant is emphasized.

QRS complexes obtained from the left lower lobe were positive in deflection and intermediate in size between that of the largest surface precordial chest lead and that obtained from the left mid or posterior axillary position taken at the same level as the intrabronchial electrode. As the electrode was withdrawn from the left lower lobe bronchus toward the carina and when inserted into the right major bronchus the QRS complexes were principally negative.

In 4 patients extensive body explorations were performed, and an analysis of these showed that the body surface could be divided into a plane beneath which predominantly positive patterns could be obtained, an intermediate zone of biphasic patterns, and lastly into areas in which the major deflection was a negative one. One roentgenogram is reproduced showing the intrabronchial electrode in place and the area of transitional complexes delineated by radiopaque bands. Two drawings are given showing types of complexes obtained in various positions with relation to the opaque bands.

Their results would indicate that the distribution of potential variation in the lungs corresponds approximately and qualitatively to the distribution of potential variations recorded from the body surface.—*I. R. Berger, M.D.*

Pearl, Felix, Gray, Norman, and Friedman, Bruce. Retrograde aortography with a special catheter, including demonstration of the coronary arteries. *Ann. Surg.*, Nov., 1950, *132*, 959–964.

This article discusses the technique of retrograde aortography with an arterial catheter designed by Dr. Pearl. It has been used in one human. Good arteriograms were obtained of the ascending aorta, aortic arch, and the left subclavian artery.

In dogs, satisfactory roentgenograms were obtained of the left ventricle, aortic valves, coronary arteries, proximal aorta, aortic arch and its main branches. The authors state that the use of the intra-arterial catheter offers a safe and dependable method for clear-cut and selective arteriography of regions previously not amenable to satisfactory roentgenographic demonstration.—*J. J. Gormley, M.D.*

Hedin, R. F., Miller, W. R., and Jelatis, D. G. Effect of beta irradiation on gastric acidity. *Arch. Surg.*, Oct., 1950, *61*, 748–757.

This paper is a preliminary report on studies still in progress on the reduction of gastric acidity in the dog by the use of radioactive phosphorus (P^{32}). The basic purpose is to determine whether beta radiation from P^{32} might be effectively and safely used in the

treatment of peptic ulcer by decreasing gastric secretion.

Ten dogs were used and the radioactive phosphorus solution was placed in a balloon inserted in the stomach. From the authors' data it appears that a dosage of the order of 10,000 rep produces a marked reduction in gastric acidity for a prolonged time without complete achlorhydria.—*J. J. McCort, M.D.*

Seedorf, E. E., Powell, W. N., Greenlee, R. G., and Hartman, J. T. Priodax and pseudoalbuminuria. *Radiology*, Nov., 1950, *55*, 740–742.

Pseudoalbuminuria following ingestion of priodax occurs in up to 36 per cent of cases (mostly trace amounts) when albumin is determined by Exton's reagent, Heller's ring test, or Robert's reagent. Such false positives may be obtained for as long as three days following the administration of the priodax. It is shown that the priodax, which is largely excreted by the kidneys, is precipitated by strong acids and that there is sufficient acidity in the above reagents to cause precipitation. The acid precipitate of priodax will dissolve on boiling.

Using the standard dose of 6 tablets, the frequency of "pseudoalbuminuria" roughly follows inversely the weight of the patient, yet no correlation with the urine specific gravity was obtained. No correlation of the frequency with respect to dysuria, microscopic findings, or weather conditions such as temperature or barometric pressure could be found.—*M. B. Goodwin, M.D.*

Charles, Donald R. Radiation-induced mutations in mammals. *Radiology*, Oct., 1950, *55*, 579–581.

When considering radiation-induced mutations, one must consider the type of mutation and the rate of dosage. Of the three types produced, chromosome translocations and dominant and recessive gene mutations, the former is increased by increased rate of dosage while the gene mutations are dependent only on total dosage, irrespective of time. Specifically, single doses from 400–1,600 r show a chromosome translocation rate of from 2 to 5 per cent per 100 r, while repeated small doses show a rate of 0.4 per cent per 100 r. The dominant gene mutation rate remains constant at 0.3 per cent per 100 r. Since the relative sterility produced by translocation is apparently not very serious, probably in the abortion occurring before the eighth week of pregnancy in humans, only the gene mutation rates need be considered. Dominant gene mutations appear in the immediate offspring at the rate of 0.3 per cent per 100 r and recessive gene mutations appear in the distant offspring at the rate of 0.4 per cent per 100 r, producing a total rate of 0.7 per cent per 100 r over many generations. These figures are not very accurate because of the difficulty in handling a sufficient number of mice.—*M. B. Goodwin, M.D.*

Lacassagne, A. Die hormonell bedingten Krebse. (Cancers caused by hormonal action.) *Strahlentherapie*, 1950, *83*, 589–596.

"Cancerogen" and "cancerogenic" are used throughout this paper with the author's prefatory acknowledgment that the term is imprecise since the development and forerunners of cancer in cells is still not clarified.

The single common feature possessed by the variety and multitude of the carcinogenic agents (chemical substances, viruses, physical rays) is their ability to penetrate *into* the cell without killing it and then working their slow and progressive disturbance to the point of disarranging the rhythm of cell division.

After a summary of a variety of animal experiments and observations on humans relative to the significance of the sex hormones in the development of cancer and the hypophyseal pathogenesis of tumors (in the adrenal cortex, transplanted gonads, and the thyroid) the author concludes: The majority of carcinogens known work a slow intoxication on the cell which, step by step, leads to malignant change. Under these circumstances, it is easily understood that if the hormones concerned with growth and development (gonadal and the "-tropic" pituitary hormones) act steadily instead of cyclically, they become endogenous poisons. Further, these circumstances are more likely to occur than exogenous carcinogenesis via occupational or dietary causes.

The type and manner of the transformation of simple hyperplasia to benign and then to malignant tumors under the influence of these endogenous carcinogens is as unclear as the mechanism of the exogenous carcinogens. But since the hope of a general effective therapy depends on a knowledge of these modes of action, investigation in this field deserves to be followed with greater activity.—*H. G. Moehring, M.D.*